Zi 308/309

Integrating Sound Level Meter

User Manual

GB/T 3785
GB/T 17181
GB/T 3241

IEC 61672
IEC 60651
IEC 60804

ZENITH INSTRUMENTS

Zi 308/309 Sound Level Meter User Manual

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1.04	2011.3.11	Add New Features	Zhao Dawei Qiao Jie Huang Shan
2.00	2011.9.19	Add Rs-232 Protocol	Huang Shan Qiao Jie
2.02	2013.8.14	Update The Storage Module	Huang Shan Wang Linzhang Zhao Qingyun

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6.1 NOTES.....146
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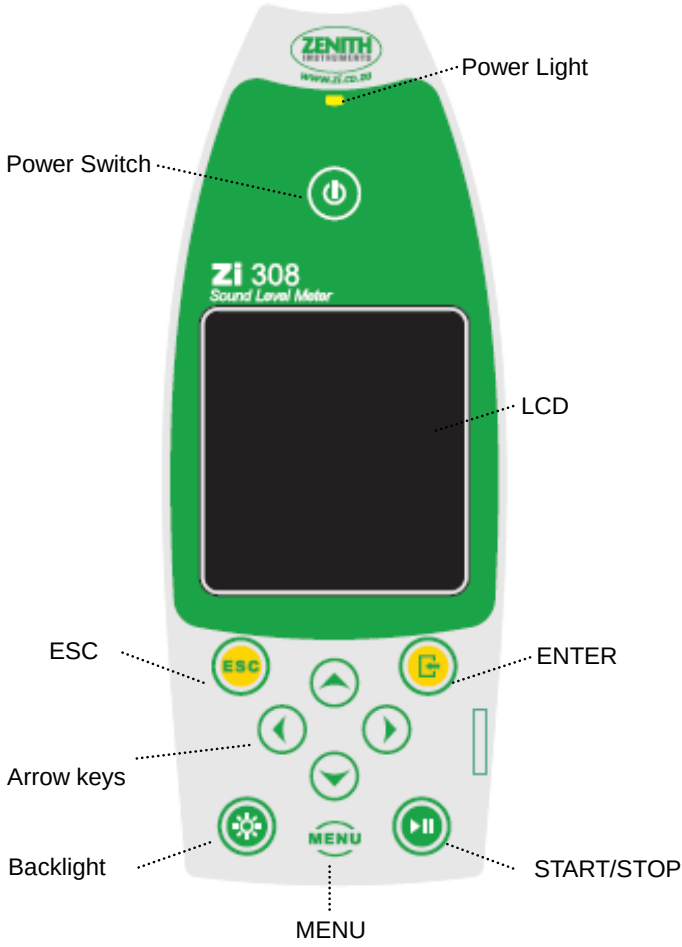
Appearance

Microphone and preamplifier
LCD with backlight
4xBattery Compartment
No-slip
1/4 inch thread
Cover Lock:
Left: unlock
External Power
9-12V
Trigger
DC
AC
BSWA 308
114.0 dB
MENU
ESC
BSWA 308
Sound Level Meter
Warning!
Made in China
PWR
MiniUSB
MicroSD
TOP
RS-232
TRIGGER
DC OUT
AC OUT

Buttons


Power Light
Power Switch
Zi 308
Sound Level Meter
LCD
ESC
ENTER
Arrow keys
Backlight
MENU
START/STOP
MENU

1 Introduction

1.1 General Description

The **ZI 308** is a digital Sound Level Meter that complies with the IEC61672 Class 1, while **ZI 309** is Class 2. This instrument is the basic model of **ZI 300** series. The use of high precision 24Bits AD converter makes the instrument to be an ideal choice for performing many kinds of measurement tasks, for example, in environmental noise, vehicle noise and industrial application. A main interface can display most useful information of the instrument status and basic noise result. In addition, there is a three profiles interface which displays independently result that measured in parallel. All profiles can be defined different filters (A, C, Z) and detector time constants (Impulse, Fast and Slow).

1.2 Applications:

- Basic noise measurement
- Environmental noise assessment
- Product quality check
- Noise reduction

1.3 Features:

- Conforms to IEC61672-1 Class 1, IEC60531 Type 1, GB/T3785-1985 Class 1, GB/T17181-1997 Class 1
- 100dB dynamic range
- Parallel compute a combination of the three frequency weighting and time weighting. 14 groups of custom measurement

- Measurement mode: SPL, RMS, LEQ, Max, Min, Peak, SD, SEL, E
- 5 octave meet GB22337-2008 requirements
- Statistics calculated as a percentage (LN) and time-domain noise curve shows
- Timing- integral measurement
- Automatically / manually switch range
- Measure the upper limit of 131dB (A) (50mV/Pa microphone) , can be expanded to 160dB (A)
- The fully digital signal processing, wide frequency response range, high dynamic range, low noise instrument background
- Large-capacity Micro SD card (TF card) storage
- RS-232 remote control port, can print measurement data via a mini-thermal printer

1.4 Specification

ZI 308/309		
Standard	ZI 308	IEC 61672-1:2002 Class 1 IEC 60651:1979 Class 1 IEC60804:2000 Class 1 IEC 61260:1995 Class 1 ANSI S1.4-1983 Class 1 ANSI S1.43-1997 Class 1 GB/T 3785-1983 Class 1 GB/T 17181-1997 Class 1 GB/T 3241-2010 Class 1
	ZI 309	IEC 61672-1:2002 Class 2 IEC 60651:1979 Class 2 IEC60804:2000 Class 2 IEC 61260:1995 Class 2 ANSI S1.4-1983 Class 2 ANSI S1.43-1997 Class 2 GB/T 3785-1983 Class 2 GB/T 17181-1997 Class 2 GB/T 3241-2010 Class 2

Microphone	ZI 308	MPA231T: 1/2 inch pre-polarized measurement microphone , Class 1, Sensitivity : 50mV/Pa Frequency Range :10-20kHz
	ZI 309	MPA309T: 1/2 inch pre-polarized measurement microphone , Class 2 Sensitivity : 50mV/Pa Frequency Range :10-12.5kHz
Microphone interface		TNC, ICCP power supply （4mA/24V）
Detection, filtering		All-digital signal processing
Measurement functions		LXY(SPL), LXrms, LXeq, LXYsd, LXsel, LXe, LXYmax, LXYmin, LXPeak, LXN Where X is the frequency weighting : A, C, Z Y is time weighting :F, S, I N is the statistical percentage of .1-99 arbitrary set
Integration time		Integration time is optional
Measurement		Automatic measurement The measurement data may be stored into the SD card with period of measure time
Frequency weighting		Parallel A, C, Z
Time weighting		Parallel F, S, I, and can measure Peak

Octave	5 Octave:31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500Hz
Machine noise	Electric signal : ZI 308: 14dB(A), 17dB(C), 23dB(z) Sound signal : ZI 308: 21dB(A), 24dB(C), 32dB(z)
	Electric signal : ZI 309: 18dB(A), 21dB(C), 27dB(z) Sound signal : ZI 309: 23dB(A), 26dB(C), 35dB(z)
Up limit	131 dB(A)（50mV/Pa microphone ） Expandable up to 160dB (A)
Frequency Range	10-20kHz
Dynamic Range	102 dB(A)
Range setting	High / low two steps , can be automatically / manually adjust
AD digits	24
Sampling frequency	48kHz
Analysis rate	64 times / sec
Noise curve	Domain shows the noise curve, History time: 1min, 2min, 10min optional
LCD display	160x160 LCD, with backlight
Storage	4G Micro SD（TF）
Post-processing software	Use processing software VA-SLM to read the store files , analysis, and generate reports

Export data	Use adapter (Micro SD to SD card sets), or directly connect the computer to read the memory card data files
Output	AC (maximum output 5Vrms of), DC (10mV/dB), RS-232 serial interface
Alarm	Can be set to Alarming
Power	4 on the 5th 1.5V alkaline batteries (LR6/AA/AM3), sustainable use of more than 18 hours . It can also be an external 7-14V DC power supply
RTC clock	Built-in backup battery. It is no need to reset when replacing the battery
Operation Temperature	-10℃ ~ 50℃ (14°F ~ 122°F)
Temperature measurement	Real-time temperature on the main screen
Size	300 x 70 x36 mm
Weight	About 620g, including batteries
Optional Accessories	
Extension cords	5m, 10m, 50m Microphone to the host
Printer	Miniature thermal printer, without ribbon, RS232 interface

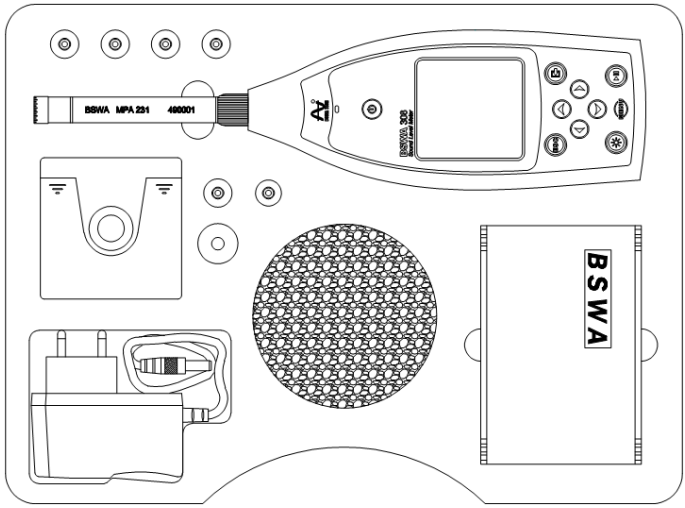
☆Note: The given data in the specifications are typical values.

1.5 Main parts &Accessories

	Nm	S/No	Description
Host Configuration	1	ZI308/9	Sound Level Meter host, without the microphone. The host of features including Sound Level Meter mode, single / three kinds of configuration: the main screen, the Profile
	2	CC308 Case	Equipment boxes
Extensions Function	3	Statistical	Statistical analysis to test the cumulative percentage
	4	Time History	Time history function, record the acoustic parameters of time-varying data
	5	Octave	Octave function, test 5 octave data
Microphone	6	MA231T	ICP preamplifier, TNC interface
	7	MP231	Class 1 microphone, including the test report（308）
	8	MP309	Class 2 microphone, including the test report（309）

Accessories	9	CA111	Calibrator of class 1, two kinds of sound pressure level, 94dB/114dB
	10	CA114	Calibrator of class 1, 94dB
	11	CA115	Calibrator of class 1,114dB
	12	WS002-9 wind-ball	90mm wind-ball, for 1/2 inch microphones
	13	Micro SD	4G, record data
	14	Adapter of Micro SD	Connected to the computer
	15	Battery	AA batteries (LR6/AA/AM3): 4 section
	16	Power adapter	External power , 9-14V DC power supply
	17	USB to RS-232 line	For communication with other devices
	18	Printer	Miniature thermal printer, without ribbon, RS232 interface
	19	CT005	Line from TNC to TNC, 5m. Connection to the host and microphone.
	20	Tripod	Measuring fixtures for the host-site support

Material	21	User manual	User manual
	22	Factory test certificate	Factory test certificate
	22	Software CD-ROM	Data processing software: VA-SLM
	24	Measurement reports of China Institute of Metrology	Certification authority



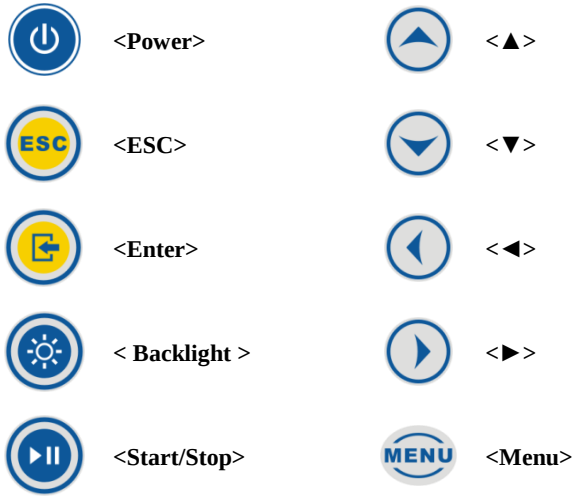
☆Note: See the packet list for more details.

2 The appearance and structure of the sound level meter

ZI 308/309 Sound Level Meter uses the same body and the keyboard layout. Instrument front are LCD screen, keyboard and status indicators.

2.1 keyboard

Sound Level Meter has 10 keys, namely:



<**Power**>:

Long press this key for 2 seconds will open the sound level meter. Long press button for two seconds will display the shut-down-dialog-box when the Sound Level Meter is in the stopped

state. Then, you can press <**Enter**> to power off.

☆Note: The <**Enter**> key is invalid when the Sound Level Meter is in the state of measurement.

<ESC>:

Exit the menu or return to previous menu. You can press **<ESC>** to clear the history curve at the time history main screen.

<Enter>:

To the next level menu; confirm the changes of the parameters; data storage (CSD format).

< Backlight >:

Press to open or close the LCD backlight, backlight duration can be set in the menu. See 4.4.2 to earn more details.

<Start/Stop>:

Start or stop the measurement.

<▲>:

Up. Used to select the menu item or adjust the parameters.

<▼>:

Down. Used to select the menu item or adjust the parameters.

<◀>:

Turn left. Used to select the menu item or adjust the parameters;

Switch main-screen.

<►>:

Turn right. Used to select the menu item or adjust the parameters;

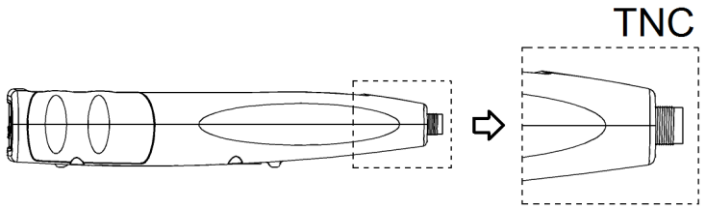
Switch measurement screen.

<Menu>:

Press to enter the main menu list.

2.2 Microphone interface

The TNC interface at the top of the Sound Level Meter is used to connect to a microphone and preamplifier (microphone and preamplifier is a whole), the TNC interface is threaded coaxial connector.



ZI 308 is equipped with a microphone of class 1, while the **ZI 309** is equipped with class 2:

MPA231T:

1/2 inch pre-polarized measurement microphone, class 1.
Sensitivity: 50mV/Pa.
Frequency range: 10 – 20 kHz.

Sound Level Meter itself with the ICCP power.

Current: 4mA; voltage: 24V.

MPA309T:

1/2 inch pre-polarized measurement microphone, class 2.

Sensitivity: 40mV/Pa.

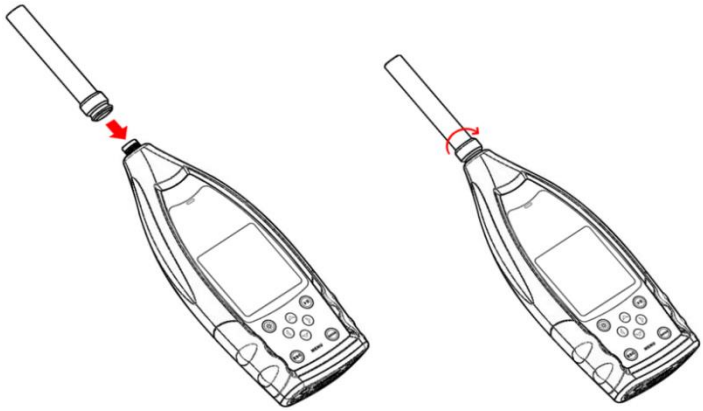
Frequency range: 10-12.5 kHz.

Sound Level Meter itself with the ICCP power.

Current: 4mA; voltage: 24V.

Microphone and preamplifier are connected together by thread, unless special circumstances, otherwise please do not separate them. The microphone is a precision measurement sensors, if long-term exposure to high humidity or dust environment would impact microphone. Microphone when not in use, should be placed in a dedicated microphone box to save.

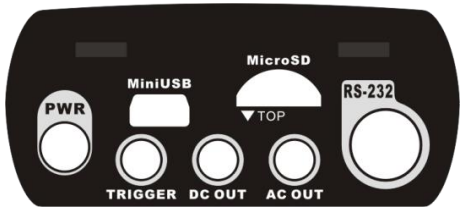
The microphone power supply is the ICCP. The supply current specifications are 4mA, voltage 24V. It will damage the microphone if voltage is more than 30V. ZI 308/309 Sound Level Meter has provided I CCP power, so can be directly connected microphone.



When you are ready to install the microphone, please inserted into TNC interface. Then tighten the thread until the connections are tight.

2.3 Sound Level Meter data and power supply interface

There are 7 interfaces at the bottom of the Sound Level Meter. Open the rubber cover to look at these interfaces.



PWR:

Power connector, using the standard DC socket (within the core diameter 2.5mm), can be connected to the 7-14V external power supply.

☆Note: Supply voltage over 14V could damage the device!

MiniUSB:

Unused.

The MicroSD:

MicroSD card socket, using a standard MicroSD (TF) card as a storage device. ☆Note: The front (literally) down!

RS-232:

As standard RS-232 interface at remote control mode. It can be used to connect to iniature -thermal-printer in the printer mode.

TRIGGER:

Trigger input interface using a standard 3.5mm headphone jack.

(Look at 4.4.4 for more details.)

DC OUT:

DC output interface, using a standard 3.5mm headphone jack.

(Look at 4.6 for more details.)

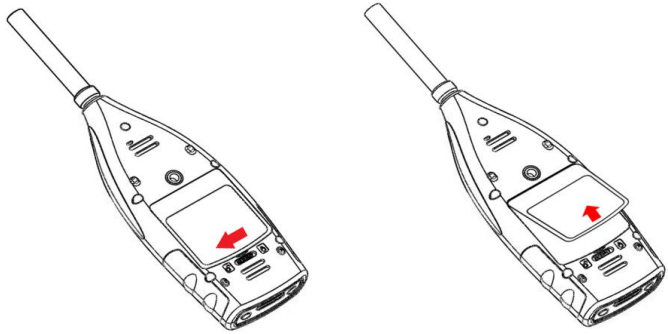
AC OUT:

AC output interface, using a standard 3.5mm headphone jack.

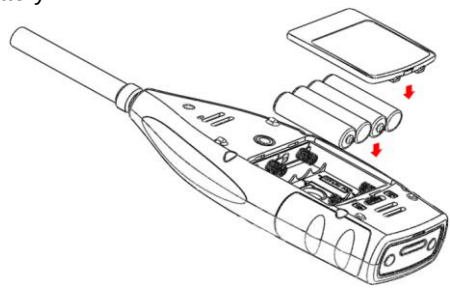
AC output is the output of the microphone, the maximum output voltage of ± 7VPeak.

2.4 Battery

Turn the button to the left side to unlock the battery compartment cover. Then lift the cover to open it.



The **ZI 308/309** use four Alkaline battery (LR6/AA/AM3), paying attention to +/- marking in the battery compartment. Do not mix used and new batteries. Close and lock the battery compartment after change the battery.



☆Note: Please ensure that the polarity of the battery compartment and the battery polarity is consistent!

3 Measurement interface specification

Sound Level Meter has two functions measurement mode: the **Sound Level Meter mode** and **octave mode**. You can select in the menu.

Sound Level Meter mode has six measurement-screens. You can press **<◄>**, **<►>** to switch. 6 interface: Main screen, 3profile, LN, Time history, Custom measurement 1 and Custom measurement 2.

Octave mode has 1 interface: Octave.

3.1 Screen display icons and meaning

Main screen of **Sound Level Meter mode**, for example:

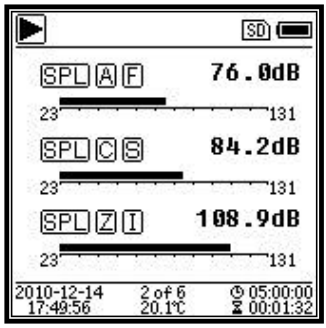
This picture is Main screen of **Sound Level Meter mode**. All the icons are light. Each icon meaning:

	Start/Stop.
	Over range (upper or lower). The current state is more than the upper range.
NSP	ICCP status. It will be on when the ICCP power supply is turned off.
TRG	Trigger status. It will be on when Sound Level Meter is in the trigger mode.
232 PRT	RS-232 status. Display **232** when remote mode. Display **PRT** when print mode.
USB	USB status. Display **USB** when connected to computer.
SD	Micro SD status. Display **SD** when using SD.
	Power status. Display plug when using external power. Display battery when using battery.
LEQ SPL RMS MAX PEK	Shows the measured parameters.
A C Z	Frequency weighted icon.
F S I	Time weighted icon.
AUTO LOW HIGH	Range status icon.
114.0 dB	Display measurement value.

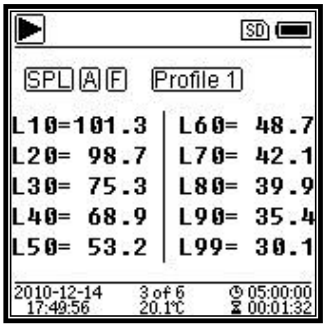
	Display measurement value.
2010-12-14 17:49:56	Date and time.
1 of 6	The current page and total pages
20.1℃	Temperature in the machine.
05:00:00 00:01:32	Display measure time. : Timing integration time, : Duration time.

3.2 Measurement interface

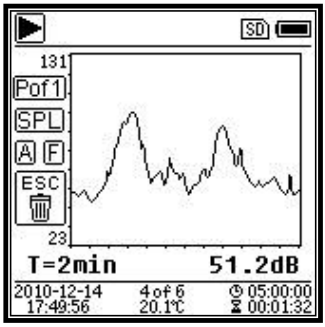
Main screen. Display the measurement results and the corresponding integration mode, frequency weighting, time weighting and range. The main screen displays is the first set of 3 profile。



3 Profile. Display three groups of measurement results .Group 1 also showed in the main screen.

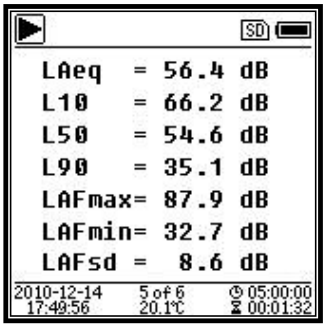


Statistical analysis. Display 10 groups of statistics the percentage of results. Each group of data sources (one of 3 Profile) and the percentage value can be customized.

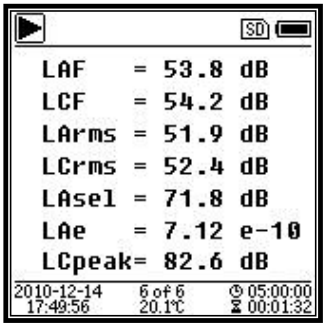


Time history. Shows the current noise value and time domain curve. You can customize the data sources (one of 3 Profile) and the timeline length (1min, 2min, 10min).

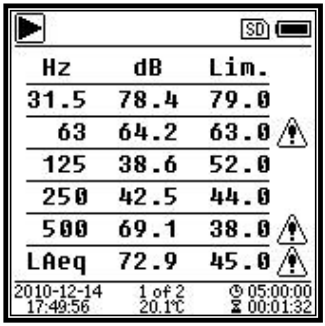
In this interface, press <**ESC**> to clear the screen and re-display the curve.



Custom measurement 1. The user can set the type of the 14 sets of data. This interface can be displayed before the 7 groups of measurement data.



This interface can be displayed to the other seven groups of measurement data.



Octave. Display LAeq, LCeq or LZeq and five octave value. You can set alarm limits. If you exceed the limit, the alarm icon is displayed

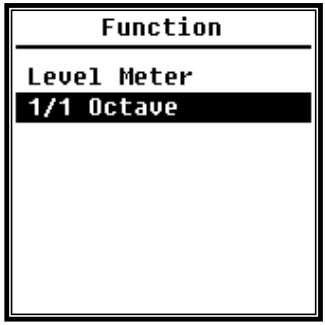
☆Note: If the SD icon is displayed in the main screen, you can press <**Enter**> to save data as CSD type in both mode after stopping the measurement. The icon can be opened in MENU/ Measurement/MEAS. Setup/ Logger [].

4 Operation and the Setting of the Menu

Press **<MENU>** to enter the main menu.

4.1 Function

Select **Function** and press <**Enter**> to enter **Function** interface.



Press **<▲>**, **<▼>** to select measurement mode. Press <**Enter**> to save settings and turn back. Press <**ESC**> to turn back.

4.2 Calibration

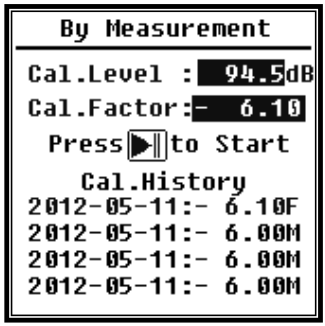
Select **Calibration** and press <**Enter**> to enter **Calibration** interface.

Temperature, humidity, barometric pressure and so on will impact the microphone's sensitivity. Before each measurement, user must calibrate the Sound Level Meter.

There are two calibration methods: Calibration by manual and auto calibration. Calibration by manual method can manually adjust the calibration factor.

4.2.1 By Measurement (Auto calibration)

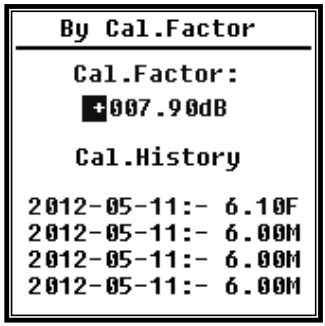
Select **By Measurement** and press <**Enter**> to enter the auto-calibration interface.



Sound Level Meter calibration can be adjusted SPL between 0 ~ 199.9dB. <◄> <►> and <▲> <▼> keys to select the calibration sound pressure level, and <**start / stop**> key to start calibration. The measurement result is the calibration factor. Then select **OK** to save the calibration factor, select **Cancel** to discard the alignment factor. This interface can also display the calibration history.

4.2.2 By Cal.Factor(Calibration by manual)

Select **By Cal.Factor** and press <**Enter**> to enter **By Cal.Factor** interface.



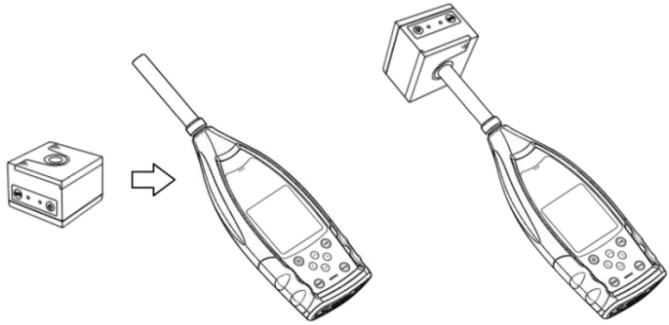
Users can manually adjust the calibration factor. Press <**Enter**> to save the Cal.Factor. Press <**ESC**> to turn back. In the time history, **M** means **By Measurement**, while **F means** By **Cal**.**Factor**.

4.2.3 Auto-calibration process

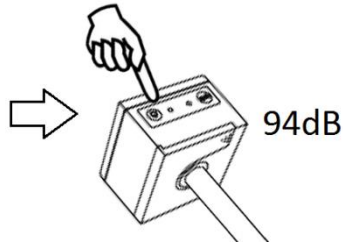
Automatic calibration routine calibration, the user needs to use the calibrator. ZI comply with the IEC60942 standard class-1 and class-2 acoustic calibrator.

Auto-calibration process:

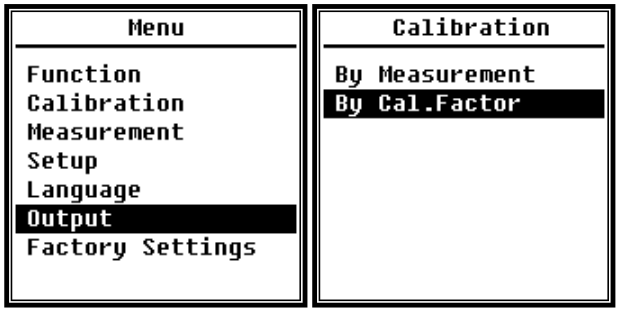
(1) First insert the microphone into the cavity of the calibrator, and to ensure that plug into the bottom and do not loose;



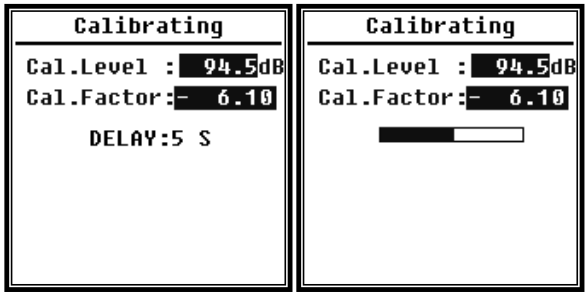
(2) Then open the power of the calibrator and the calibrator is set to a constant sound pressure level (for example, 94dB);



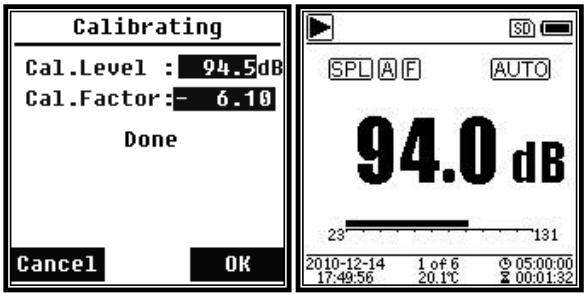
(3) Select **Calibration** in the menu. And then press <**Enter**> to enter the **Calibration** menu.



(4) In the **By Measurement**, first adjustment **Cal.Level**, and then press <**Start/Stop**> to start.

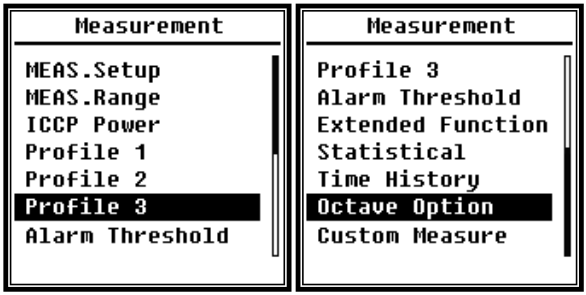


(5) After the end of the calibration, the Sound Level Meter will display the latest results of the calibration, press <**OK**> button to save the calibration results. Press <**Cancel**> to ignore this measurement.



(6) Return to the main screen, press the <**start / stop**> button to start the measurement (the calibrator is still working), the measurement results show that the stability of 94 dB.

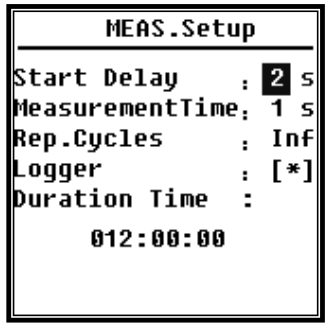
4.3 Measurement



Press <▲> <▼> to select the menu item, press <**Enter**> to enter the sub-menu.

4.3.1 MEAS.Setup

Meas.Setup contains four menu options: **Start Delay**, **Measure Time**, **Rep.Cycles** and **Logger**.



Start Delay:

Delay time after press <**Start/Stop**>. There are nine options: 2s, 3s, 4s, 5s, 10s, 15s, 20s, 25s, 30s.Press **<◄>**, **<►>** to select.

☆Note: The Start Delay is very important. You can't set to 0.

Measurement Time:

Time block, which also be used as buffer time. The total measurement time will be **Measurement Time** * **Rep.Cycles**. **Measurement Time** has 8 options: **1s, 5s, 10s, 30s, 1m, 5m, 10m, 30m,** which can be change by <◄>/<►>

Rep.Cycles:

Number of replications: 1-254 or Inf. It also is the number of data in buffer file (time history file).

Logger:

Measurement data can be stored in the SD card if checked.

There are three types of files can be saved: SWN, OCT and CSD.

Level Meter mode, the 3 profiles time history will be saved in SWN file, and 1/1 Octave mode, the time history will be saved in OCT file. In both modes, when the measurement stopped, press <**Enter**>, the current data will be saved in CSD file.

☆Note: if menu/ Measurement/ Octave option/ integral: No, the saved spectrum will be the data of the last second; and if Integral: Yes, the saved spectrum will be the Leq value of the **Measurement Time (Measurement Time ,** not multiplied by **Rep.Cycles) in the OCT file, or** will be the Leq value of the whole **Measurement Time (MeasurementTime * Rep.Cycles) i**n the CSD file

☆Note: If the version of the Sound Level Meter is 2.01, then, if menu/ Measurement/ Octave option/ integral: No, the saved spectrum will be the data of the last second; and if Integral: Yes, the saved spectrum will be the Leq value of the whole **Measurement Time (MeasurementTime * Rep.Cycles)** in the CSD file and OCT file.

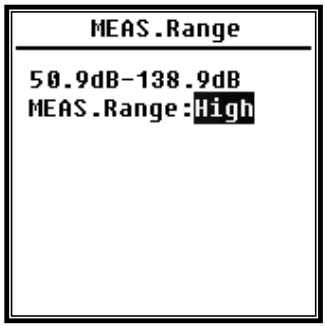
Duration Time:

Show the total measurement time.

☆Note: There is a example to explain hwo to use the **Duration Time**.

First, you set the **mode** of **Profile1** to **LEQ**. Then, you set the **save** of **Profile1** to **RMS**. Set the **Measurement Time** to 5 minutes. Set the **Rep**.**Cycles** to 24. Then the **Duration Time** is 2h. Look at the **SWN** file after stopped. The **LEQ** in the **SWN** file is **LEQ** of every 5 minutes.

4.3.2 MEAS.Range



There are three ranges: **Low, High, Auto.** Press **<◄>**, **<►>** to select.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

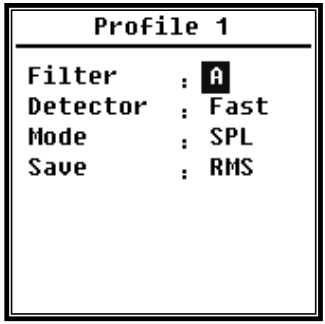
4.3.3 ICCP Power

ICCP provide the user to enable or disable the ICCP function. If the ICCP function enable, Sound Level Meter can use the ICCP microphone as the input. User can use other transducer when disable

the **ICCP**.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.3.4 Profile 1



Profile 1 enables the user to set the proper parameter of the measurement for first profile which is one of the parallel measurements and display at data-source-name on main screen and first item of 3 profile screens.

In order to enter the window one has to press the **<Enter>** on the inversely displayed **Profile 1** text of the Measurement list. **Profile 1** option contains 4 alternatives for measurement setup. Press **<Up>** and **<Down>** button to select the options.

Filter:

Supply 3 frequency weighting: **A**, **C** and **Z**. Press**<◄>**, **<►>** to select the appropriate frequency weighting.

Detector:

Supply 3 time weighting: **Fast**, **Slow** and **Imp**. Press**<◄>**, **<►>** to select the appropriate time weighting.

Mode:

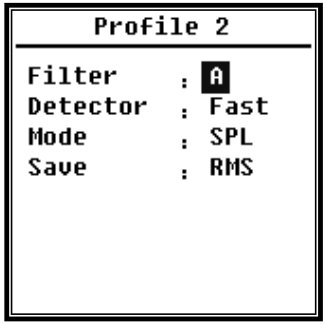
Supply 6 mode of significant results: **SPL**, **RMS**, **PEAK**, **LEQ**, **MAX and MIN**. Press **<◄>**, **<►>**to select the appropriate option.It is used to set the display mode on the measurement screen. Also, this can set the mode of data in the **CSD** file.

Save:

Supply 4 mode of save data: **RMS**, **PEAK**, **MAX and MIN**. Press **<◄>**, **<►>** to select the appropriate option. This can set the mode of data in the **SWN** file.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.3.5 Profile 2



It is same as profile 1. User can set the second profile data of 3profile.

4.3.6 Profile 3

It is same as profile 1. User can set the third profile data of 3profile.

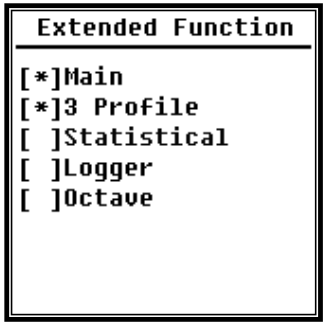
4.3.7 Alarm Threshold

When the measurement data exceeds the alarm value, the power light color will turn red.

The alarm value setting range is 20 ~ 200dB.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.3.8 Extended Function



Main and **3 Profile** is enabled by default.

Statistical, **Logger** and **Octave** is optional feature. Enter the password to make it enable after user has got permission.

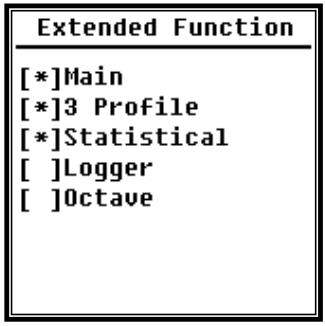
When you press <**Enter**> at the locked item, you will enter the password page. For example:

The password consists of eight digital.

Press <◄ <►> to select a location, press <▲> <▼> to set password.

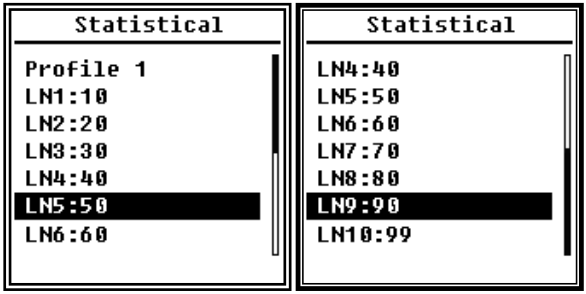
Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

If setup is successful, **Extended Function** page will be changed:



Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.3.9 Statistical



Profile:

Press **<◄>**, **<►>** to select data source. Data source can be profile 1 or profile 2 or profile 3. Press **<Enter>** to save settings. Press <**ESC**> to turn back.

LN1-LN10:

Set statistical percentage value. Appears to the right is the current percentage value.

Press <**Enter**> to enter setup page. For example:

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.3.10 Time History

Profile:

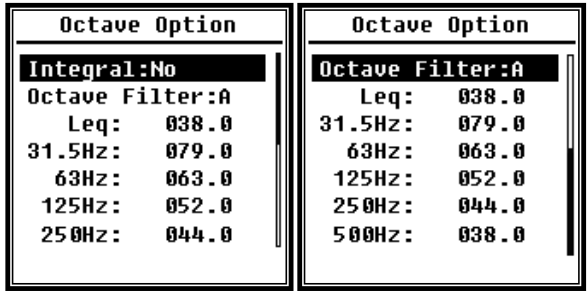
Press **<◄>**, **<►>** to select data source. Data source can be profile 1 or profile 2 or profile 3.

Time:

Time means timeline length. Press **<◄>**, **<►>** to select.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.3.11 Octave Option



Integral:

Yes=Integral, No= not integral. Press **<◄>**, **<►>** to select.

If you select integral, then the LEQ means:

(1) In the OCT file: LEQ means the whole measure time (**measure time**, not Multiplied by **rep.Cycles**).

(2) In the CSD file:LEQ means the measure time(**measure time**, Multiplied by **rep.Cycles**).

Otherwise, LEQ means every second.

Press <**Enter**> to save settings and turn back. Press <**ESC**> to turn back.

Octave Filter:

Press **<◄>**, **<►>** to select.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

Leq 和 31.5Hz~500Hz:

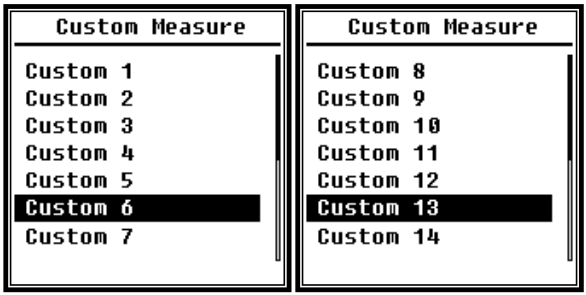
Set limits. If the measured value exceeds the limits then it will warn.

Press <**Enter**> to turn to the setup page. For example:

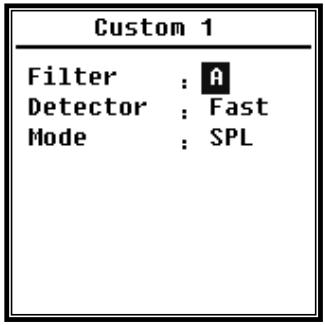
Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

☆Note: Range setting does not affect the measurements of Octave

4.3.12 Custom Measure



Press **<Enter>** to turn to the setup page. As shown below:



Filter:

Supply 3 frequency weighting: **A**, **C** and **Z**. Press**<◄>**, **<►>** to select the appropriate frequency weighting.

Detector:

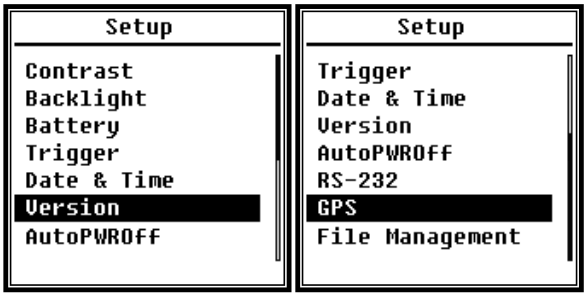
Supply 3 time weighting: **Fast**, **Slow** and **Imp**. Press**<◄>**, **<►>** to select the appropriate time weighting.

Mode:

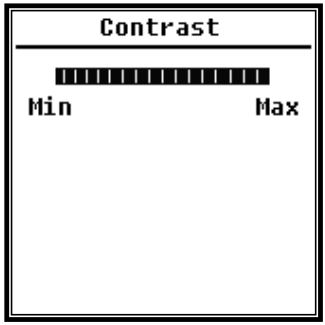
Supply 19 mode of significant results: **SPL**, **RMS**, SD, SEL, E, **PEAK**, **LEQ**, **MAX, MIN,LN1-LN10**. Press **<◄>**, **<►>** to select the appropriate option.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.4 Setup



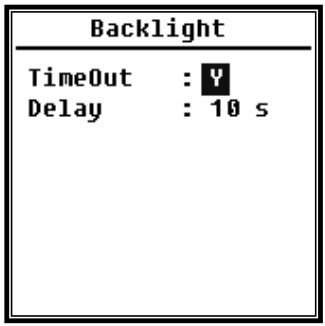
4.4.1 Contrast



Press **<◄>**, **<►>**to setup contrast.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.4.2 Backlight

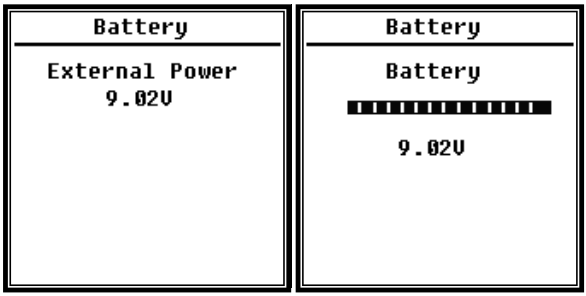


Sound Level Meter provides automatic off function. Select **TimeOut**, and then press **<◄>**, **<►>** to whether to provide automatic off function. If you select **Y**, then the Sound Level Meter will provide automatic off.

Delay means the light time when you set the **TimeOut** to **Y.**

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.4.3 Battery

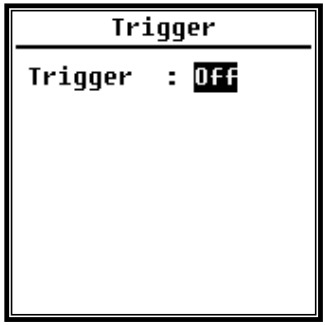


The **Battery** enables the user to check the internal battery condition. In order to enter the screen, press the **<Enter>** on the inversely displayed **Battery** text of the **Setup** list.

The **Battery** screen is closed and the instrument returns to the **Setup** list after pressing the **<Esc>** or the **<Enter>**.

The instrument can be powered from the external power supply, from four AA rechargeable or standard batteries. The view presented on the display for each of 2 kinds of powering sources is different. The current battery voltage is displayed together with its approximate state (in the graphical form).

4.4.4 Trigger



Trigger is a analog input for control the Sound Level Meter start or stop measurement. **ZI 308/309** has a 3.5mm socket in the bottom for trigger input. Short the signal and ground of the socket to start measurement, otherwise to stop the measurement. Notice that when enable the

Trigger function, the **<Start/Stop>** button on the surface of the Sound Level Meter is disable.

4.4.5 Date & Time

Select **Date & Time** and press <**Enter**> to enter the setup page.

Setup Date:

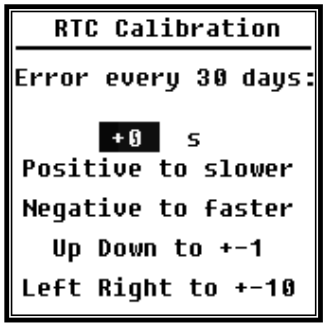
There are three date formats. Press **<Enter>** to save settings and turn to the date setup page. Press <**ESC**> to turn back. For example:

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

Setup Time:

Setup Time is the same as the **Setup Date.**

RTC Calibration



The Sound Level Meter has a RTC. User can adjust it by setting the time of error-every 30 days.

The adjust range is +-157 seconds.

If the adjust time is positive, then the timer will be slower, otherwise, it will be faster.

If user doesn't have high demands on time accuracy, the user can't do RTC calibration.

4.4.6 Version

The **Version** item provides the information of instrument. It contains the type and serial number of the instrument, the version and date of the software.

Press <**Enter**> to save settings and turn back. Press <**ESC**> to turn back.

4.4.7 AutoPWROff

In order to save the internal source of the instrument's power, **ZI 308/309** provides the function for automatic shut down the instrument.

This function is only play a part in the state when the instrument is not measuring. The power save mode is disabled in case of a running measurement.

If this option is set, the instrument is switched off after the fixed time which has been set, from pressing any button. If it happened, the pressing of any button would cause the time count restart form zero.

AutoPwrOff provides the time how long the instrument can continue without measurement after the last time of the button has been pressed . There are 5 options to choose: **1m**, **5m**, **10m**, **30m**, **off** (**off** means the time is infinite). Press **<◄>**, **<►>**to select.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.4.8 RS-232

User can setup the RS-232 port in this interface.(Look at RS-232 for more details.)

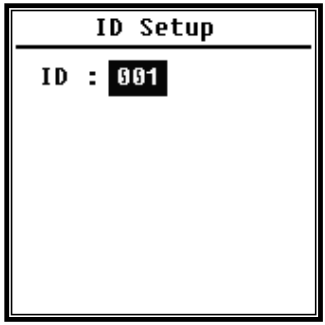
RS-232 Mode:

There are two kind of mode: **Remote Control** and **Printer**. In the **Remote Control** mode, user can setup the Sound Level Meter or get the measurement data from the Sound Level Meter through RS-232 interface. In the **Printer** mode, user can use a

printer to print the measurement data.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

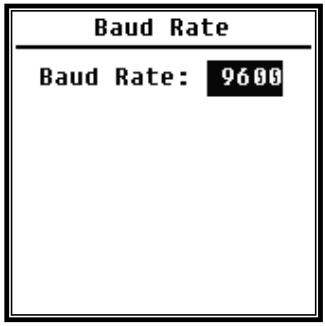
ID Setup:



Set ID for the machine. ID is used for multi-machine networking for remote communication to distinguish between the Sound Level Meter. ID's range is 1-255.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

Baud Rate:



There are three kind of baud rate: 4800, 9600, 19200.

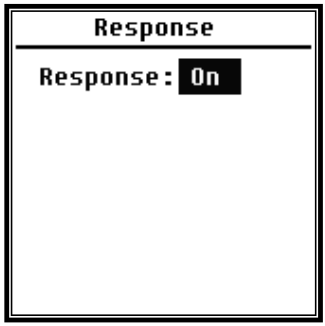
Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

Flow Control:

There are two kinds of flow control: **Software Flow** and **Hardware Flow**.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

Response:



User can open or close the ACK/NACK signal by setting the response.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.4.9 GPS

Open or close the GPS function. This is an optional module.

4.4.10 File Management

This function is to show and operate the saved SWN, OCT, CSD files. The figure in the right is the number of the relevant files.

Press <**Enter**> to enter the operate-page.

SWN File: available option: Delete

Press **<◄>**, **<►>** to select the file you want to delete. If the number you selected is 000, it means to delete all files.

Press **<Enter>** to delete the chosen file and press <**Cancel**> (<**ESC**>) to turn

OCT File: available option: Delete

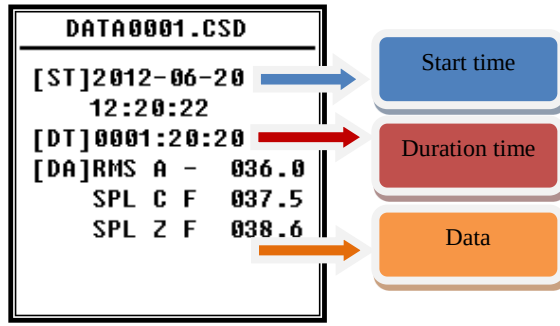
The operation is the same as the SWN file.

CSD File: available option: Delete, Load

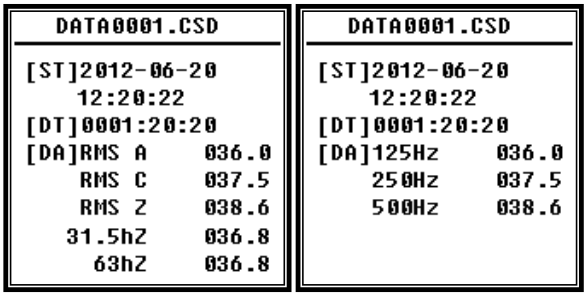
The operation is the same as the SWN file.

The option can be changed to **Read** by **<◄>/<►>**, and press **<Enter>** to load the chosen file.

The interface of the saved CSD file in Level Meter mode:



The interface of the saved CSD file in 1/1 Octave mode:

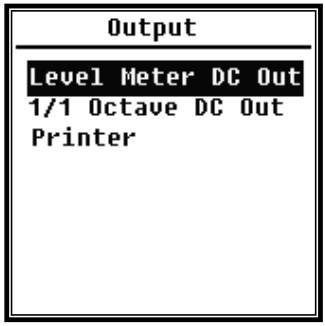


Press **<◄>**, **<►>** to switch.

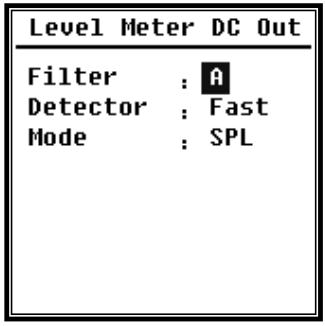
4.5 Language

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

4.6 Output

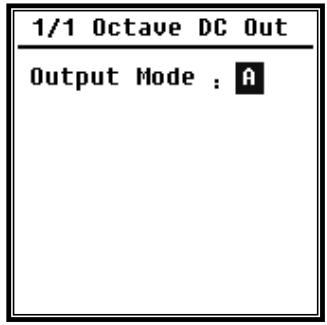


Level Meter DC Out:



You can set the DC output in this interface. Output signal is analog signal. Correspondence between output amplitude and the noise values is 10mv/dB. Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

1/1 Octave DC Out:

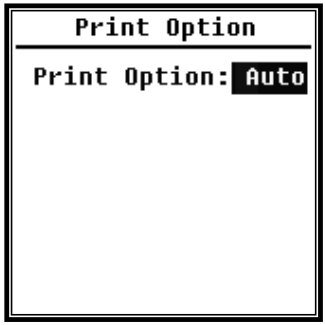


A total of eight kinds of octave output options: LAeq, LCeq, LZeq, 31.5Hz, 63Hz, 125Hz, 250Hz, 500Hz.

Press **<Enter>** to save settings and turn back. Press <**ESC**> to turn back.

Printer:

Print Option:

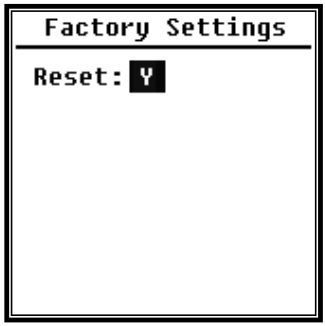


Press **<◄>**, **<►>** to select **Auto** or **Manual**. **Auto** will print measurement result automatically after stopped measurement. If you select **Manual**, you must select **Print Now** and press <**Enter**> when you want to print measurement data.

☆Note: User also can select **Print Now** and press <**Enter**> to print measurement data at the **Auto** mode.

Please turn on the printer first, and then connect to the Sound Level Meter

4.7 Factory Settings



Factory Settings provides the function for restore the parameter which has been set by customer, the parameter will be initialized to the original parameter which has been set at factory.

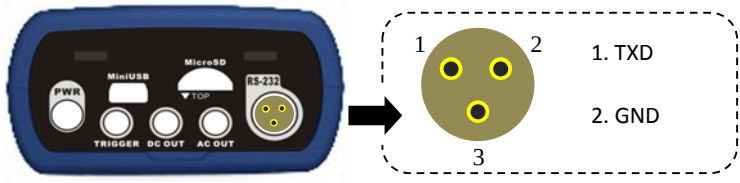
Press **<◄>**, **<►>** to choose **Y** (Yes) or **N** (No). Choose **Y** and pressing **<Enter>** will initialize the parameter. Choose **N** or press **<ESC>** will not effect on the parameter.

5 RS-232 Communication Protocol

The Sound Level Meter **ZI 308/309** has an RS-232 serial interface. User can modify the configuration of the Sound Level Meter via a serial interface and control the Sound Level Meter to run and to stop, and get the current measurement parameters and measurement results for further processing. Serial operation does not affect keyboard operation.

5.1 Hardware configuration and settings of interface

ZI 308/309 uses three-wire serial interface with LEMO plug and socket. Below is the definition of RS-232 interface.



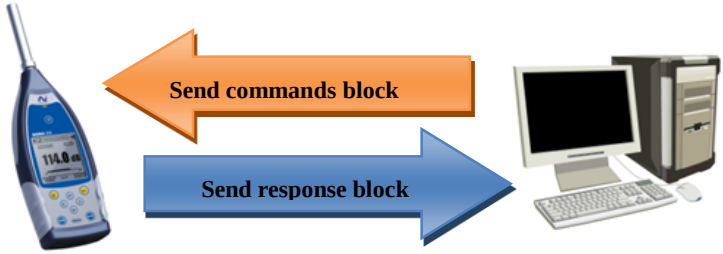
RS-232 Transfer settings:

Transfer Mode	Full-duplex
Synchronous / asynchronous	Asynchronous Transfer
Baud rate	4800, 9600, 19200 bps
Data bits	8 bit
Stop bit	1 bit
Parity	None

Flow Control	According to the time data in the rating table to operate

5.2 Transfer Protocol

ZI 308/309 RS-232 interface protocol is based on a block transfer, as shown below:



A typical command block or response block consists of “starting character, ID attribute character, command or data, the parity bit of the characters, carriage returns, line feeds ”, as shown below:

<STX>	ID	ATTR	Command or data	<ETX>	BCC	<CR>	<LF>

5.2.1 The beginning and end of the block transfer

A command block or response block contains some start characters and end characters as shown below:

Name	Hex	Meaning
<STX>	02H	start character
<ETX>	03H	stop character
<CR>	0DH	carriage returns
<LF>	0AH	line feeds

5.2.2 ID

Each command block contains an ID .It is used to distinguish among a network of more than one Sound Level Meter. When the Sound Level Meter receives a command block, it will match the ID contained in the command block and its own ID .If matched, the corresponding operation will be performed, if not, then ignore this command. The response block returned from the Sound Level Meter also contains the ID information which is used to indicate that the block is sent by which one;☆Note: Please ensure that the ID of Sound Level Meter in the same network are different from each other, otherwise the error will occur during operation!

ID is one byte of binary. It ranges from 1 to 255.The corresponding hexadecimal value is 01H - FFH.

It means that the command is a broadcast command if the ID contained in command block is 00H.And the Sound Level Meter will execute the instruction without any return data, regardless of its own ID when the command is a broadcast command.

Name	Range	Meaning
ID	01H~FFH	ID
	00H	Broadcast instruction

5.2.3 ATTR Attribute character

ATTR attribute characters indicate the type of command or response.

Name	Hexadecimal code	Meaning
'C'	43H	Command block
'A'	41H	Response block
<ACK>	06H	Normal response
<NAK>	15H	Error response

5.2.4 BCC check

BCC check value is calculated by the sender. It is included in a block. The receiver can calculate the block's BCC value and will compare with the BCC value contained in the send block. If same, it indicates that the received block is correct.

BCC value is calculated by using bytes between <STX> and <ETX> with XOR operation. Sound Level Meter will not verify operation and directly authorized instruction if BCC is 00H.This way you can simplify the sending of the instruction block, but do not recommend this way

for long-distance applications, because the BCC is the only way to guarantee reliable data transmission.

Name	Range	Meaning
BCC	01H~FFH	XOR checksum
	00H	Ignore the checksum

5.2.5 Block transfer format

Block transfer of data is divided into four types: command block, response block, normal response block and error response block, the following were to describe the four types of instruction format .

Command: sent by the computer.

<STX>	ID	ATTR	Instruction	Parameter	<ETX>	BCC	<CR>	<LF>
1	1	1	3	N	1	1	1	1

Byte

ATTR = 'C'.

On the table, all instructions occupy 3 bytes. If you have more than one parameter, all parameters should separate by spaces.

Response block: sent by the Sound Level Meter.

<STX>	ID	ATTR	Response data	<ETX>	BCC	<CR>	<LF>

1	1	1	N	1	1	1	1

Byte

ATTR = 'A'.

If you have more than one response data, each separated by a comma.

Normal response: sent by the Sound Level Meter.

<STX>	ID	ATTR	<ETX>	BCC	<CR>	<LF>
1	1	1	1	1	1	1

Byte

ATTR=<ACK>.

Error response: sent by the Sound Level Meter

<STX>	ID	ATTR	Error code	<ETX>	BCC	<CR>	<LF>
1	1	1	4	1	1	1	1

Byte

ATTR=<NAK>.

The error code occupies four bytes. The error code value is listed in the following table. The meaning of error code is described in section 5.2.6.

Description:

Error code	Meaning
0001H	Instruction error
0002H	Parameter error

0003H	Can't make the appropriate operating at the current state

5.2.6 Recovery of transmission errors

Various errors may occur when the instruction block or in response to the block transfer. The following descript the Sound Level Meter will how to deal with and restore to the initial state when an error occurs.

(1) Block transfer not complete

Section 5.2.5 describes the four kinds of block transmission format. When the Sound Level Meter receives the beginning of a block of characters <STX>, you continue to receive the remaining data until the end of the block <CR>, <LF>. When the data reception is complete and correct parity, the Sound Level Meter will conduct follow-up actions. If received the character <STX> start of the block again before <CR>, <LF>, the Sound Level Meter will ignore all the information previously received and re-start the reception of a block.

(2) Validation failure

After receiving the data block, Sound Level Meter will verify. When validation fails, the Sound Level Meter will ignore this instruction.

(3) Instruction error

The Sound Level Meter may not recognize the instruction received. This may be because the computer sends an undefined instruction, or

unexpected error has occurred during transmission. When the above errors occur, the Sound Level Meter will return a NAK block, which contains the error code 0001H.

(4) Parameter error

Command block parameters may be wrong. This may be because the parameters not separate by a space, the range of the parameter error, an incorrect number of arguments. When the above error occurs, the Sound Level Meter will return NAK block, which contains the error-code 0002H.

(5) The current state can't make the appropriate operating

The current state can't make the appropriate operating when the following happens.

1	Sound Level Meter mode is required to return octave data. Or octave mode asked to return to a Sound Level Meter data.
2	Be required to perform the calibration operation in the measurement mode.
3	Be required to change the measurement parameters or system parameters in the measurement mode.

When the above error occurs, the Sound Level Meter will return NAK block, which contains the error-code 0003H.

5.2.7 Flow Control

The Sound Level Meter use three-wire serial port, which does not

contain the hardware flow control pins. Sound Level Meter does not require software flow control. When the operation according to the requirements of the rated section 2.9 parameters, we can guarantee the correctness of the send data and receive data.

5.2.8 Multi-machine operation

More than one Sound Level Meter can be connected to an RS-232 bus, to form a measurement net work. Users can broadcast instruction to change the set of all the Sound Level Meter, or access to data and parameters of a Sound Level Meter by ordinary instruction.

Need to pay attention:

Ensure that the ID of each Sound Level Meter is not the same.

User can not broadcast command which can return any data;

5.2.9 Rated parameters

Name	Min	Rated	Max	Description
The response time of the Sound Level Meter	—	—	2s	Exceeds this value, the computer should do the time-out processing
The time interval of	—	100ms	—	—

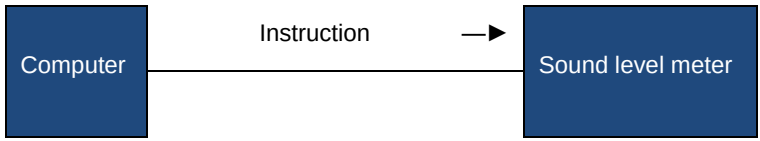
the Sound Level Meter to send bytes				
The waiting time after Sound Level Meter received <STX>	—	Unlimited	—	Means the received <STX> continue to wait for the remaining data
Time interval of the Sound Level Meter to receive the bytes	—	Unlimited	—	Means that the speed of the computer to send data can be very slow

5.3. Instruction

The instruction is divided into two types: set instructions and query instructions. Set instructions: set the measurement parameters and system parameters of Sound Level Meter.

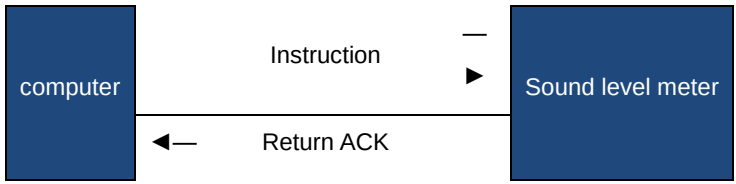
Query instructions: used to query parameters and data of the Sound Level Meter. There are three types of send-instruction. Are: set instruction (no response), set instructions (with response), query instructions.

(1) Set instruction (no response):

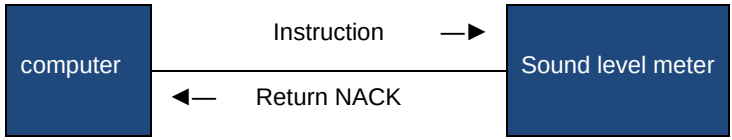


(2) Set instructions (with response):

Normal response:

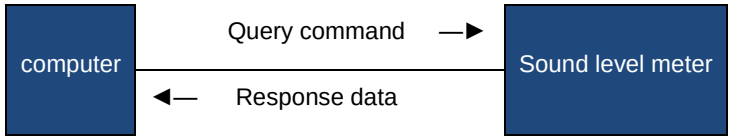


Error response:

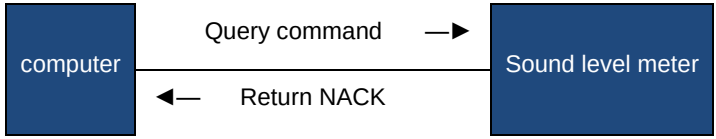


(3) Query command:

Normal response:



Error response:



5.3.1 Instruction list

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5.3.2 Instruction format

In this section, “□□□” on behalf of the three characters of the directive, “p1, p2 ....." on behalf of the parameter "d1, d2 ..." represents the data, "_" represents a space.

Instruction block has multiple parameters. These parameters need to be separated by a space:

□□□ Instruction without parameters

□□□p1 Instruction with a parameter

□□□p1_p2 There are two parameters of the instruction

□□□? Instruction with query parameters

□□□p1_? Instruction with one parameter and a query parameter

□□□p1_ p2_? Instruction with two parameters and a query parameter

Range of parameters in instruction can be large, for example from 1 to 255. These parameters are in ASCII format. Therefore, you can send 1-3 bytes.

□□□93 Parameter is 93

□□□124 Parameter is 124

Note whether it is 93 or 124, they are an argument. So the individual

numbers can't be separated by spaces.

□□□1_64 There are two parameters, namely 1 and 64.

Note that 1 and 64 are two different parameters. So parameters need to be separated by space.

Parameters can have a decimal point. However, if the actual value is an integer, decimal point and decimal bits can be omitted.

More data in the response block, separated by commas:

d1, d2, d3 Response return three data.

Response block, the median of the actual data returned is less than its maximum possible number of digits, leading zeros.

For example:

076, 009 Return data is 76 and 9.

If the returned data contains date data, use the slash "/" to separate. If the data returned contains data, use a colon ":" to separate the data:

2011/08/05, 12:13:55

5.3.3 Instruction describe

Note:

1. In the following description, the value of parameter, range, default, are represented by ASCII code;
2. The default is the state of Sound Level Meter factory delivery or restore the factory settings;
3. Described below, use the "_" indicates a space.

IDXp1: Setup ID

ID of Sound Level Meters in a same network must be different. Otherwise, there will be a communication error.

☆**Note:** When the instruction ID of Sound Level Meter is correctly received, ACK signal will be returned with the new ID.

	Instruction			Parameters
Explanation	IDX			p1: ID number Range: 1~255 Default: 1
ASCII	I	D	X	1
Hexadecimal	49H	44H	58H	31H
Byte	1	1	1	1~3
Return	ACK / NAK			

Example 1: The instruction will set the ID of 3.

02 01 43 **49 44 58 33** 03 25 0D 0A

Return: an ACK. Note where ID has been changed to 3 (03H).

02 03 06 03 04 0D 0A

Example 2: The instruction will set the ID of 255.

02 01 43 **49 44 58 32 35 35** 03 24 0D 0A

Return: an ACK. Note where ID has been changed to 255 (FFH).

02 FF 06 03 F8 0D 0A

IDX?: Query ID number

	Instruction			Parameters
Explanation	IDX			Query parameter: ?
ASCII	I	D	X	?
Hexadecimal	49H	44H	58H	3FH
Byte	1	1	1	1
Return	Return the current ID number			

Example: query ID number:

02 01 43 **49 44 58 3F** 03 29 0D 0A

Return: the current ID number 001

02 01 41 **30 30 31** 03 70 0D 0A

BRTp1: Set the RS-232 baud rate

☆**Note:** When the BRT instruction is correctly received by the Sound Level Meter, it will use the current baud rate to return through the ACK signal, and then update the baud rate.

	Instruction			Parameters
Explanation	BRT			p1: RS-232 baud rate 2=4800bps 3=9600bps 4=19200bps Default: 3
ASCII	B	R	T	3
Hexadecimal	42H	52H	54H	33H
Byte	1	1	1	1
Return	ACK / NAK			

Example: Set the baud rate to 9600bps:

02 01 43 **42 52 5433** 03 34 0D 0A

Return: ACK;

02 01 06 03 06 0D 0A

BRT?: Query the RS-232 baud rate

	Instruction			Parameters
Explanation	BRT			Query parameter: ?
ASCII	B	R	T	?
Hexadecimal	42H	52H	54H	3FH
Byte	1	1	1	1
Return	Return the current baud rate			

Example: Query the current baud rate:

02 01 43 **42 52 543F** 03 38 0D 0A

Return: the current baud rate is 9600bps:

02 01 41 **33** 03 72 0D 0A

XONp1: Set the software / hardware flow control

	Instruction			Parameters
Explanation	XON			p1: Flow control mode 0=hardware flow control 1= software flow control Default: 1
ASCII	X	O	N	1
Hexadecimal	58H	4FH	4EH	31H
Byte	1	1	1	1
Return	ACK / NAK			

Example: set to software flow control mode:

02 01 43 **58 4F 4E31** 03 2B 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

XON?: Query flow control mode

	Instruction			Parameters
Explanation	XON			Query parameter: ?
ASCII	X	O	N	?
Hexadecimal	58H	4FH	4EH	3FH
Byte	1	1	1	1
Return	Return flow control mode			

Example: query flow control mode

02 01 43**58 4F 4E 3F** 03 25 0D 0A

Return: the current flow control mode is software flow control:

02 01 41 **31** 03 70 0D 0A

RETp1: Set response mode

Response is the ACK / NAK signal returned from the Sound Level Meter (HIS and OCS instruction returns the status of the SD card or NAK signal).The user can disable or allow such a response signal.

☆Note: RET instruction itself is not affected by response mode.

When the Sound Level Meter receive the RET instruction, it will return ACK/NAK whether the current state is enabled or disabled. Query command is not subject to the influence of response mode.

	Instruction			Parameters
Explanation	RET			p1: Response mode 0=Disabled ;1=Enabled Default: 1
ASCII	R	E	T	1
Hexadecimal	52H	45H	54H	31H
Byte	1	1	1	1
Return	ACK / NAK			

Example: Set to allow response:

02 01 43 **52 45 5431** 03 31 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

RET?: Query response mode

	Instruction			Parameters
Explanation	RET			Query parameter: ?
ASCII	R	E	T	?
Hexadecimal	52H	45H	54H	3FH
Byte	1	1	1	1
Return	Return response mode			

Example: query response mode:

02 01 43**52 45 54 3F** 03 3F 0D 0A

Return: the current response mode is to allow the response:

02 01 41 **31** 03 70 0D 0A

MEMp1: Set the measurement mode

When MEM instruction is correctly received by the Sound Level Meter, Sound Level Meter will switch to the main interface of the octave mode or the main interface of Sound Level Meter mode.

	Instruction			Parameters
Explanation	MEM			p1: measurement mode 0=Octave ; 1=Sound level mode Default: 1
ASCII	M	E	M	1
Hexadecimal	4DH	45H	4DH	31H
Byte	1	1	1	1
Return	ACK / NAK			

Example: Set the **Sound Level Meter** mode:

02 01 43 **4D 45 4D31** 03 37 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

MEM?: Query measurement mode

	Instruction			Parameters
Explanation	MEM			Query parameter: ?
ASCII	M	E	M	?
Hexadecimal	4DH	45H	4DH	3FH
Byte	1	1	1	1
Return	Return the measurement mode			

Example: Query the measurement mode:

02 01 43**4D 45 4D 3F** 03 39 0D 0A

Returns: the current measurement mode is Sound Level Meter mode:

02 01 41 **31** 03 70 0D 0A

CALp1: Set the SPL, and automatic calibration

☆**Note:** When CAL instruction is correctly received by the Sound Level Meter, an ACK will be returned at the beginning and end of the calibration. In the records of calibration, M represents the auto-calibration.

	Instruction	Parameters
Explanation	CAL	p1: SPL Range: 0~199.9 Default: 94.0

ASCII	C	A	L	94
Hexadecimal	43H	41H	4CH	39H, 34H
Byte	1	1	1	1~5
Return	ACK / NAK			

Example 1: Set the calibration sound pressure level of 94dB, and calibration:

02 01 43 **43 41 4C 39 34** 03 00 0D 0A

Return : ACK

02 01 06 03 06 0D 0A

Return again after the end of the calibration:

02 01 06 03 06 0D 0A

Example 2: Set the calibration sound pressure level value of 113.8dB, and calibrate:

02 01 43 **43 41 4C 31 31 33 2E 38** 03 28 0D 0A

Return : ACK:

02 01 06 03 06 0D 0A

Return again after the end of the calibration:

02 01 06 03 06 0D 0A

CAL?: Query calibration sound pressure level and the calibration factor

	Instruction			Parameters
Explanation	MEM			Query parameter: ?
ASCII	C	A	L	?
Hexadecimal	43H	41H	4CH	3FH
Byte	1	1	1	1
Return	Returns the value of the calibration sound pressure level and the calibration factor			

Example: Query the calibration sound pressure level and the calibration factor:

02 01 43**43 41 4C 3F** 03 32 0D 0A

Return: the current calibration of sound pressure level is 094.0, the calibration factor is 000.00:

02 01 41 **30 39 34 2E 30 2C 2B 30 30 30 2E 30 30** 03 7B 0D 0A

CAFp1: Manually calibrate

This command can modify the calibration factor.F is the identity of the manual calibration in the calibration record.

	Instruction			Parameters
Explanation	CAF			p1: Calibration factor Range: -199.99~+199.99 （+ Can be omitted） Default: 0
ASCII	C	A	F	0
Hexadecimal	43H	41H	46H	30H
Byte	1	1	1	1~7
Return	ACK / NAK			

Example: Set the calibration factor value of 0.74dB (+ sign is omitted).

02 01 43 **43 41 46 30 2E 37 34** 03 1A 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

CAF?: Query calibration records

Query the most recent calibration records(Four groups).

	Instruction			Parameters
Explanation	CAF			Query parameter: ?
ASCII	C	A	F	?
Hexadecimal	43H	41H	46H	3FH
Byte	1	1	1	1
Return	Returns the value of calibration records in the last four groups. Format “Year / Month / day, hours: minutes: seconds, the calibration factor, Identity”。 Identity: M=Automatic calibration, F=Manual calibration.			

Example: Query the calibration records:

02 01 43 **43 41 46 3F** 03 38 0D 0A

Return: the data returned by this command use a slash "/" split date, use a colon ":" split time.

Calibration history is 2011/08/04, 17: 03: 28, +001.29, F, 2011/08/04, 17: 03: 02, +001.25, F, 2011/08/04, 17: 02: 20, +000.71, F, 2011/08/04, 17: 02: 00, +001.27, M.

02 01 41 **32 30 31 31 2F 30 38 2F 30 34 2C 31 37 3A 30 33 3A 32 38 2C 2B 30 30 31 2E 32 39 2C 46 2C 32 30 31 31 2F 30 38 2F 30 34 2C 31 37 3A 30 33 3A 30 32 2C 2B 30 30 31 2E 32 35**

2C 46 2C 32 30 31 31 2F 30 38 2F 30 34 2C 31 37 3A 30 32 3A 32 30 2C 2B 30 30 30 2E 37 31 2C 46 2C 32 30 31 31 2F 30 38 2F 30 34 2C 31 37 3A 30 32 3A 30 30 2C 2B 30 30 31 2E 32 37 2C 4D 03 62 0D 0A

BSEp1_p2_p3_p4: Basic Settings

☆**Note:** HIS instruction is different from the other set commands, it does not return the ACK signal, but returns the status of the SD card or NAK.

Set the start delay, measurement time, repeat cycle and logger.

	Instruction	Parameter **1**	Parameter**2**	Parameter3	Parameter 4
Explanation	BSE	p1: Start delay 0=2s ; 1=3s ; 2=4s ; 3=5s ; 4=10s ; 5=15s ; 6=20s	p2: Measurement time 0=1s ; 1=5s ; 2=10s ; 3=30s ; 4=1m ; 5=5m ; 6=10m ; 7=30m ;	P3: Repeat cycle 0=Infinite 1=1; 2=2; …… …… …… …… ……	P4: Logger 0=Not stored 1=Stored Default:0

				; 7=25s ; 8=30s ; Default: 0	Default: 0	254=254 ; Default: 0	
ASCII	B	S	E	0	0	0	0
Hexadecimal	42H	53H	45H	30H	35H	0x30	0x30
Byte	1	1	1	1	1	1	1
Return	Return status : 0=Successfully set. The SD card is ok. 1= Successfully set.SD card abnormal. 2= Successfully set. But did not detect the SD card. 3= Successfully set. The logger function does not unlock.						

Example: set: 3s, 1s, 5 times, stored.

02 01 43 **42 53 45 31 20 30 20 35 20 31** 03 32 0D 0A

Returns: the set successfully, SD card is OK.

02 01 41 **30** 03 71 0D 0A

BSE?: Query Basic Settings

	Instruction			Parameter
Explanation	BSE			Query parameter: ?
ASCII	B	S	E	?
Hexadecimal	42H	53H	45H	3FH
Byte	1	1	1	1
Return	Return basic settings. Return order: start delay, the measurement time, repeat cycle, logger.			

Example: Query the basic settings:

02 01 43 **42 53 45 3F** 03 28 0D 0A

Returns: the current basic settings: 3s, 1s, 5, stored..

02 01 41 **31 2C 30 2C 35 2C 31** 03 68 0D 0A

RNGp1: Range setting

	Instruction			Parameter
Explanation	RNG			p1: Range 0=Low ;1=High ;2=Auto Default: 2
ASCII	R	N	G	2
Hexadecimal	52H	4EH	47H	32H
Byte	1	1	1	1
Return	ACK / NAK			

Example: Setting range is Auto:

02 01 43 **52 4E 47 32** 03 2A 0D 0A

Return: ACK:

02 01 06 03 06 0D 0A

RNG?: Query range setting

	Instruction			Parameter
Explanation	RNG			Query parameter: ?
ASCII	R	N	G	?
Hexadecimal	52H	4EH	47H	3FH
Byte	1	1	1	1
Return	Return range setting			

Example: query range setting:

02 01 43 **52 4E 47 3F** 03 27 0D 0A

Return: the current range is Auto:

02 01 41 **32** 03 73 0D 0A

ICPp1: Set ICCP power state

	Instruction			Parameter
Explanation	ICP			p1: ICCP power state 0=On ; 1=Off Default: 0
ASCII	I	C	P	0
Hexadecimal	49H	43H	50H	30H
Byte	1	1	1	1
Return	ACK / NAK			

Example: open ICCP power:

02 01 43 **49 43 50 30** 03 29 0D 0A

Return: ACK:

02 01 06 03 06 0D 0A

ICP?: Query ICCP power state

	Instruction			Parameter
Explanation	ICP			Query parameter: ?
ASCII	I	C	P	?
Hexadecimal	49H	43H	50H	3FH
Byte	1	1	1	1
Return	Return ICCP power state			

Example: query ICCP power state:

02 01 43 **49 43 50 3F** 03 26 0D 0A

Return: ICCP power is open:

02 01 41 **30** 03 71 0D 0A

PR1p1_p2_p3_p4: Setup Profile1

	Instruction			Parameter **1**	Parameter **2**	Parameter **3**	Parameter 4
Explanation	PR1			p1: Frequency weighting 0=A 1=C 2=Z Default : 0	p2: Time weighting 0=Fast 1=Slow 2=Imp. Default : 0	p3: Integration mode 0=SPL 1=RMS 2=PEAK 3=LEQ 4=MAX 5=MIN Default : 0	P4:Save 0=RMS 1=PEAK 2=MAX 3=MIN Defalut :0
ASCII	P	R	1	0	0	0	0
Hexadecimal	50H	52H	31H	30H	30H	30H	30
Byte	1	1	1	1	1	1	1

Return	ACK / NAK

Example: Set Profile1: A, Fast, SPL, save RMS

02 01 43 **50 52 31 30 20 30 20 3020 30**03 50 0D 0A

Return: ACK:

02 01 06 03 06 0D 0A

PR1?: Query Profile1 Settings

	Instruction			Parameter
Explanation	PR1			Query parameter: ?
ASCII	P	R	1	?
Hexadecimal	50H	52H	31H	3FH
Byte	1	1	1	1
Return	Return Profile1 setting			

Example : Query Profile1 setting:

02 01 43 **50 52 313F** 03 4F 0D 0A

Return: current Profile1 setting mode is: A, Fast, SPL, save RMS:

02 01 41 **30 2C 30 2C 30 2C 30** 03 71 0D 0A

PR2p1_p2_p3: Setup Profile2

	Instruction			Parameter **1**	Parameter **2**	Parameter **3**	Parameter **4**
Explanation	PR2			p1: Frequency weighting 0=A 1=C 2=Z Default: 1	p2: Time weighting 0=Fast 1=Slow 2=Imp. Default:	p3: Integration mode 0=SPL 1=RMS 2=PEAK 3=LEQ 4=MAX 5=MIN Default:	P4:Save 0=RMS 1=PEAK 2=MAX 3=MIN Defalut:1
ASCII	P	R	2	0	0	0	
Hexadecimal	50H	52H	32H	30H	30H	30H	
Byte	1	1	1	1	1	1	
Return	ACK / NAK						

PR2?: Query Profile2Settings

	Instruction			Parameter
Explanation	PR2			Query parameter: ?
ASCII	P	R	2	?
Hexadecimal	50H	52H	32H	3FH
Byte	1	1	1	1
Return	Return Profile2 setting			

PR3p1_p2_p3: Setup Profile3

	Instruction	Parameter **1**	Parameter **2**	Parameter **3**	Parameter **4**
Explanation	PR3	p1: Frequency weighting 0=A 1=C 2=Z Default: 2	p2: Time weighting 0=Fast 1=Slow 2=Imp. Default: 0	p3: Integration mode 0=SPL 1=RMS 2=PEAK 3=LEQ 4=MAX 5=MIN Default	P4:Save 0=RMS 1=PEAK 2=MAX 3=MIN Defalut:2

						: 0	
ASCII	P	R	3	0	0	0	0
Hexadecimal	50H	52H	33H	30H	30H	30H	30
Byte	1	1	1	1	1	1	1
Return	ACK / NAK						

PR3?: Query Profile3Settings

	Instruction			Parameter
Explanation	PR3			Query parameter: ?
ASCII	P	R	3	?
Hexadecimal	50H	52H	33H	3FH
Byte	1	1	1	1
Return	Return Profile3 setting			

ALMp1: Set alarm limits

	Instruction			Parameter
Explanation	ALM			p1: alarm limit Range: 0~200 Default: 100
ASCII	A	L	M	100
Hexadecimal	41H	4CH	4DH	31H, 30H, 30H
Byte	1	1	1	1-3
Return	ACK / NAK			

Example: Setting alarm limits 100dB:

02 01 43 **41 4C 4D 31 30 30** 03 32 0D 0A

Return: ACK:

02 01 06 03 06 0D 0A

ALM?: Query the alarm limits

	Instruction			Parameter
Explanation	ALM			Query parameter: ?
ASCII	A	L	M	?
Hexadecimal	41H	4CH	4DH	3FH
Byte	1	1	1	1
Return	Return alarm limit			

Example: query alarm limits:

02 01 43 **41 4C 4D 3F** 03 3C 0D 0A

Return: the current alarm limit is 100dB

02 01 41 **31 30 30** 03 70 0D 0A

ETFp1_p2: Unlock the extended function

	Instruction			Parameter **1**	Parameter **2**
Explanation	ETF			p1: Extended function 0=Statistical 1=Logger 2=Octave	p2: Password
ASCII	E	T	F	0	XXXXXXXX
Hexadecimal	45H	54H	46H	30H	XXXXXXXX
Byte	1	1	1	1	8
Return	ACK / NAK				

Example: Unlock statistical analysis, the password is 12345678:

02 01 43 **45 54 4630 20 31 32 33 34 35 36 37 38** 03 0C 0D 0A

Return: ACK:

02 01 06 03 06 0D 0A

ETF?: Query expansion functional state

	Instruction			Parameter
Explanation	ETF			Query parameter: ?
ASCII	E	T	F	?
Hexadecimal	45H	54H	46H	3FH
Byte	1	1	1	1
Return	return order is: statistical analysis, logger, octave。			

	0=Lock, 1=Unlock。

Example: query state:

02 01 43 **45 54 46 3F** 03 2B 0D 0A

Return: statistical analysis, logger and octave are all unlocked.

02 01 41 **31 2C 31 2C 31** 03 70 0D 0A

STSp1_p2_p3_p4_p5_p6_p7_p8_p9_p10_p11: Setup statistical analysis

	Instruction			Parameter **1**	Parameter **2~11**
Explanation	STS			p1:Data sources 0=Profile 1 1=Profile 2 2=Profile 3 Default: 0	p2~p11: 10 statistics percentage values. Range: 1~99 Default: 10, 20, 30, 40, 50, 60, 70, 80, 90, 99
ASCII	S	T	S	0	10_20_30_40_50_60_70_80_90_99
Hexadecimal	53H	54H	53H	30H	31H, 30H, 20H, 32H, 30H, 20H,

					33H, 30H, 20H, 34H, 30H, 20H, 35H, 30H, 20H, 35H, 30H, 20H, 36H, 30H, 20H, 37H, 30H, 20H, 38H, 30H, 20H, 39H, 30H, 20H, 39H, 39H
Byte	1	1	1	1	10~20+9（Space）
Return	ACK / NAK				

Example: set source of statistical analysis is Profile1, statistics percentage values were 10,20,30,40,50,60,70,80,90,99:

02 01 43 **53 54 53 30 20 31 30 20 32 30 20 33 30 20 34 30 20 35 30 20 36 30 20 37 30 20 38 30 20 39 30 2039 39** 03 26 0D 0A

Return: ACK:

02 01 06 03 06 0D 0A

STS?: Query statistical analysis setting

	Instruction			Parameter
Explanation	STS			Query parameter: ?
ASCII	S	T	S	?

Hexadecimal	53H	54H	53H	3FH
Byte	1	1	1	1
Return	Return sources of statistical analysis and 10 groups statistical percentage			

Example: query statistical analysis setting

02 01 43 **53 54 53 3F** 03 28 0D 0A

Return: statistical analysis source is Profile1 and the statistics percentage values are 10,20,30,40,50,60,70,80,90,99.

02 01 41 **30 2C 31 30 2C 32 30 2C 33 30 2C 34 30 2C 35 30 2C 36 30 2C 37 30 2C 38 30 2C 39 30 2C 39 39** 03 70 0D 0A

HISp1_p2: Setup time history

	Instruction			Parameter **1**	Parameter **2**
Explanation	HIS			p1: Data source 0=Profile1 1=Profile2 2=Profile3 Default: 1	p2: Timeline 0=1min 1=2min 2=10min Default: 1
ASCII	H	I	S	1	1
Hexadecimal	48H	49H	53H	31H	31H
Byte	1	1	1	1	1
Return	ACK / NAK				

Example: set Profile2 the data sources. The timeline is 2min.:

02 01 43 **48 49 53 31 20 31** 03 31 0D 0A

Return: ACK:

02 01 06 03 06 0D 0A

HIS?: Query time history setting

	Instruction			Parameter
Explanation	HIS			Query parameter: ?
ASCII	H	I	S	?
Hexadecimal	48H	49H	53H	3FH
Byte	1	1	1	1
Return	Return logger setting.			

Example: query logger setting:

02 01 43 **48 49 53 3F**03 2E 0D 0A

Returns: the current logger setting: the data sources is Profile2, time line is 2min.

02 01 41 **31 2C 31** 03 6D 0D 0A

OCSp1_p2_p3_p4_p5_p6_p7_p8: Setup Octave

	Instruction	Parameter **1**	Parameter **2**	Parameter **3~8**
Explanati	OCS	p1:	p2:	p3~p8: LEQ

on				Integral 0=No 1=Yes Default: 1	frequency weighting 0=A 1=C 2=Z Default: 0	and octave limits Range: 0-199.9 Default: 38, 79, 63, 52, 44, 38
ASCII	O	C	S	1	0	38_79_63_52_44_38
Hexadecimal	4FH	43H	53H	31H	30H	33H, 38H, 20H, 37H, 39H, 20H, 36H, 33H, 20H, 35H, 32H, 20H, 34H, 34H, 20H, 33H, 38H
Byte	1	1	1	1	1	6~30+5（space）
Return	ACK / NAK					

Example: setting is not integral, frequency weighting is C, LEQ and octave limits are 60dB.

02 01 43 **4F 43 53 30 20 31 20 36 30 20 36 30 20 36 30 20 36 30 20 36 30 20 36 30** 03 3D 0D 0A

Return: ACK:

02 01 06 03 06 0D 0A

OCS?: Query octave settings

	Instruction			Parameter
Explanation	OCS			Query parameter: ?
ASCII	O	C	S	?
Hexadecimal	4FH	43H	53H	3FH
Byte	1	1	1	1
Return	Return octave settings			

Example: query octave set:

02 01 43 **4F 43 53 3F** 03 23 0D 0A

Returns: return octave settings. LAeq Limit =038.0dB ; 31.5Hz Limit =079.0dB ; 63Hz Limit =063.0dB ; 125Hz Limit =052.0dB ; 250Hz Limit =044.0dB ; 500Hz Limit =038.0dB

02 01 41 **31 2C 30 2C 30 33 38 2E 30 2C 30 37 39 2E 30 2C 30 36 33 2E 30 2C 30 35 32 2E 30 2C 30 34 34 2E 30 2C 30 33 38 2E 30** 03 62 0D 0A

CUSp1_p2_p3_p4: Custom setup

	Instruction	Parameter **1**	Parameter **2**	Parameter **3**	Parameter **4**

Explanation	CUS			p1: Group number Range: 1-14	p2: Frequency weighting 0=A 1=C 2=Z	p3: Time weighting 0=Fast 1=Slow 2=Imp.	p4: Measurement mode 0=SPL 1=RMS 2=SD 3=SEL 4=E 5=Max 6=Min 7=Peak 8=LEQ 9=LN1 …… 18=LN10
ASCII	C	U	S	1	0	0	0
Hexadecimal	43H	55H	53H	31H	30H	30H	30H
Byte	1	1	1	1~2	1	1	1~2
Return	ACK / NAK						

Example: set custom measurement in group 1 for the A-weighted, Fast, SPL

02 01 43 **43 55 53 31 20 30 20 30 20 30** 03 27 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

Default value (with the * parameter is actually not work):

	Frequency weighting	Time weighting	Measurement mode	Meaning
Custom **1**	0	0	8	A, Fast*, LEQ
Custom **2**	0	0	9	A*, Fast*, LN1
Custom **3**	0	0	13	A*, Fast*, LN5
Custom **4**	0	0	17	A*, Fast*, LN 9
Custom **5**	0	0	5	A, Fast, Max
Custom **6**	0	0	6	A, Fast, Min
Custom **7**	0	0	2	A, Fast, SD
Custom **8**	0	0	0	A, Fast, SPL
Custom **9**	1	0	0	C, Fast, SPL

Custom **10**	0	0	1	A, Fast*, RMS
Custom **11**	1	0	1	C, Fast*, RMS
Custom **12**	0	0	3	A, Fast*, SEL
Custom **13**	0	0	4	A, Fast*, E
Custom **14**	1	0	7	C, Fast*, Peak

CUSp1_?: Query custom settings

	Instruction			Parameter**1**	Parameter**2**
Explanation	CUS			p1: Group number Range: 1~14	Query parameter: ?
ASCII	C	U	S	1	?
Hexadecimal	43H	55H	53H	31H	3FH
Byte	1	1	1	1~2	1
Return	Return custom settings				

Example: query settings in 12 groups:

02 01 43 **4355 53 31 32 20 3F** 03 1A 0D 0A

Return: the current 12 groups setting is A-weighted, Fast, SEL:

02 01 41 **31 32 2C 30 2C 30 2C 30 33** 03 6D 0D 0A

CONp1: Contrast setting

	Instruction			Parameter
Explanation	CON			p1: Contrast Range: 0~14 Default: 7
ASCII	C	O	N	7
Hexadecimal	43H	4FH	4EH	37H
Byte	1	1	1	1
Return	ACK / NAK			

Example: set the contrast of 9:

02 01 43 **43 4F 4E 39** 03 38 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

CON?: Query contrast setting

	Instruction			Parameter
Explanation	CON			Query parameter: ?
ASCII	C	O	N	?
Hexadecimal	43H	4FH	4EH	3FH
Byte	1	1	1	1
Return	Return contrast settings			

Example: Query contrast setting:

02 01 43 **43 4F 4E 3F** 03 3E 0D 0A

Returns: the current contrast is 7

02 01 41 **30 37** 03 46 0D 0A

BLTp1_p2: Backlight settings

	Instruction			Parameter**1**	Parameter**2**
Explanation	BLT			p1: Backlight delay 0=Y, Automatically shut down ; 1=N, Never turn off Default: 0	p2: Backlight duration 0=10s ; 1=20s ; 2=30s ; 3=40s ; 4=50s ;5=60s Default: 0
ASCII	B	L	T	0	0
Hexadecimal	42H	4CH	54H	30H	30H
Byte	1	1	1	1	1
Return	ACK / NAK				

Example: set the backlight will automatically shut down, duration 20s:

02 01 43 **42 4C 54 30 20 31** 03 38 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

BLT?: Query backlight settings

	Instruction			Parameter
Explanation	BLT			Query parameter: ?
ASCII	B	L	T	?
Hexadecimal	42H	4CH	54H	3FH
Byte	1	1	1	1
Return	Return backlight settings			

Example: Query the backlight settings;

02 01 43 **42 4C 54 3F** 03 26 0D 0A

Return: the current backlight is set to never shut down, the duration of 20s (backlight never turned off, backlight duration in fact, and does not work.)

02 01 41 **31 2C 31** 03 6D 0D 0A

BAT?: Check power status and the supply voltage

	Instruction			Parameter
Explanation	BAT			Query parameter: ?
ASCII	B	A	T	?
Hexadecimal	42H	41H	54H	3FH
Byte	1	1	1	1
Return	Returns the power state and power supply voltage Power state: 0=Battery ; 1=External power supply			

	Supply voltage: xx.xx V

Example: check battery value:

02 01 43 **42 41 54 3F** 03 2B 0D 0A

Returns: the current power supply is an external power supply, power supply voltage is 9.24V

02 01 41 **31 2C 30 39 2E 32 34** 03 7D 0D 0A

TRGp1: Trigger settings

	Instruction			Parameter
Explanation	TRG			p1: Trigger switch 0=Off；1=On Default: 0
ASCII	T	R	G	0
Hexadecimal	54H	52H	47H	30H
Byte	1	1	1	1
Return	ACK / NAK			

Example: turn off trigger:

02 01 43 **54 52 47 30** 03 32 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

TRG?: Query trigger settings

	Instruction			Parameter
Explanation	TRG			Query parameter: ?
ASCII	T	R	G	?
Hexadecimal	54H	52H	47H	3FH
Byte	1	1	1	1
Return	Return trigger settings			

Example: Query trigger settings

02 01 43 **54 52 47 3F**03 3D 0D 0A

Returns: the current trigger state is turned off

02 01 41 **30** 03 71 0D 0A

DATp1_p2_p3_p4: Date setting

	Instruction	Parameter 1	Parameter2	Parameter3	Parameter4
Explanation	DAT	p1: Date format 0=Year/Month/Day 1=Month/Day/Year 2=Day/Year/Month	p2: Year Range: 1980~2115	p3: Month Range: 1~12	p4: Day Range: 1~31

				Default: 0			
ASCII	D	A	T	0	2011	1	1
Hexadecimal	44H	41H	54H	30H	32H, 30H, 31H, 31H	31H	31H
Byte	1	1	1	1	4	1~2	1~2
Return	ACK / NAK						

Example: set the date format is year / month / day, 2011 August 5th,

02 01 43 **44 41 54 30 20 32 30 31 31 20 38 20 35** 03 0D0D 0A

Return : ACK

02 01 06 03 06 0D 0A

DAT?: Query date settings

	Instruction			Parameter
Explanation	DAT			Query parameter: ?
ASCII	D	A	T	?
Hexadecimal	44H	41H	54H	3FH
Byte	1	1	1	1
Return	Return date settings			

Example: Query date setting:

02 01 43 **44 41 54 3F** 03 2D 0D 0A

Return: the current date setting is year / month / day, 2011/08/05

02 01 41 **30 2C 32 30 31 31 2F 30 38 2F 30 35** 03 52 0D 0A

HORp1_p2_p3: Time setting

	Instruction			Parameter **1**	Parameter **2**	Parameter **3**
Explanation	HOR			p1: Hour Range: 0-23	p2: Minute Range: 0-59	p3: Second Range: 0-59
ASCII	H	O	R	1	1	1
Hexadecimal	48H	4FH	52H	31H	31H	31H
Byte	1	1	1	1~2	1~2	1~2
Return	ACK / NAK					

Example: The time is 18:37:30:

02 01 43 **48 4F 52 31 38 20 33 37 20 33 30** 03 18 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

HOR?: Query hour settings

	Instruction			Parameter
Explanation	HOR			Query parameter: ?
ASCII	H	O	R	?

Hexadecimal	48H	4FH	52H	3FH
Byte	1	1	1	1
Return	Return time settings			

Example: Query time setting:

02 01 43 **48 4F 52 3F** 03 29 0D 0A

Returns: the current time is 18:37:48

02 01 41 **31 38 3A 33 37 3A 34 38** 03 40 0D 0A

VER?: Query the version information

	Instruction			Parameter
Explanation	VER			Query parameter: ?
ASCII	V	E	R	?
Hexadecimal	56H	45H	52H	3FH
Byte	1	1	1	1
Return	Return the version information			

Example: query version information:

02 01 43 **564552 3F** 03 3D 0D 0A

Returns: the current version of the model: 308,1 480007 serial number, version 1.04, release date 2011/03/26

02 01 41 **33 30 38 2C 31 2C 34 38 30 30 30 37 2C 31 2E 30 34 2C 32 30 31 31 2F 30 33 2F 32 36** 03 5E 0D 0A

PWOp1: Auto power off settings

	Instruction			Parameter
Explanation	PWO			p1: Auto-off time 0=1min ; 1=5min 2=10min ; 3=30min ; 4=Off Default: 4
ASCII	P	W	O	4
Hexadecimal	50H	57H	4FH	34H
Byte	1	1	1	1
Return	ACK / NAK			

Example: Auto power off function is set to off

02 01 43 **50 57 4F 34** 03 3F 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

PWO?: Query auto power off settings

	Instruction			Parameter
Explanation	PWO			Query parameter: ?
ASCII	P	W	O	?

Hexadecimal	50H	57H	4FH	3FH
Byte	1	1	1	1
Return	Return auto power off settings			

Example: query auto power off settings:

02 01 43 **50 57 4F 3F** 03 34 0D 0A

Returns: the current state is off:

02 01 41 **34** 03 75 0D 0A

LNGp1: Language Selection

	Instruction			Parameter
Explanation	LNG			p1: Language selection 0=English 1=Chinese 2=Portuguese 3=Spanish Default: 0
ASCII	L	N	G	0
Hexadecimal	4CH	4EH	47H	30H
Byte	1	1	1	1
Return	ACK / NAK			

Example: Set the language to Chinese:

02 01 43 **4C 4E 47 31** 03 37 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

LNG?: Query Language Selection

	Instruction			Parameter
Explanation	LNG			Query parameter: ?
ASCII	L	N	G	?
Hexadecimal	4CH	4EH	47H	3FH
Byte	1	1	1	1
Return	Return the language selection status			

Example: query language selection:

02 01 43 **4C 4E 47 3F** 03 39 0D 0A

Returns: the currently selected language is Chinese:

02 01 41 **31** 03 70 0D 0A

OUTp1_p2_p3_p4: Output options

Set data form of DC output in Sound Level Meter mode and octave mode.

	Instruction	Param	Param	Paramet	Param

				eter **1**	eter **2**	er **3**	eter **4**
Explanation	OUT			p1: The frequency weighting of sound level meter mode 0=A 1=C 2=Z Default: 0	p2: The time weighting of sound level meter mode 0=Fast 1=Slow 2=Imp. Default: 0	p3: Measurement mode of the sound level meter mode 0=SPL 1=RMS 2=Peak Default: 0	p4: Output of octave mode 0=LAeq 1=LCeq 2=LZeq 3=31.5 Hz 4=63Hz 5=125 Hz 6=250 Hz 7=500 Hz Default: 0
ASCII	O	U	T	0	0	None	None

				1	0	0	0
Hexade cimal	4F H	55 H	54 H	30H 31H	30H 30H	None 30H	None 30H
Byte	1	1	1	1	1	1	1
Return	ACK / NAK						

Example 1: Set the output LAeq, Fast, SPL at the Sound Level Meter mode. Set the output LAeq at the octave mode.

02 01 43 **4F 55 54 30 20 30 20 30 20 30** 03 2D 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

OUT?: Query output options

	Instruction			Parameter
Explanation	OUT			Query parameter: ?
ASCII	O	U	T	?
Hexadecimal	4FH	55H	54H	3FH
Byte	1	1	1	1
Return	Return output options			

Example: query output options:

02 01 43 **4F 55 54 3F** 03 32 0D 0A

Return: A, Fast, SPL at the Sound Level Meter mode, LAeq at the octave mode.

02 01 41 **31 2C 30 2C 30 2C 30** 03 6C 0D 0A

RES: Restore factory settings

☆**Note:** After receipt of the ACK, the user must wait at least 6 seconds make it to complete the operation.

	Instruction			Parameter
Explanation	RES			Parameter: None
ASCII	R	E	S	None
Hexadecimal	52H	45H	53H	None
Byte	1	1	1	None
Return	ACK / NAK			

Example: To restore the factory settings:

02 01 43 **52 45 53** 03 07 0D 0A

Return: an ACK. Wait at least six seconds after receipt of the ACK.

02 01 06 03 06 0D 0A

STAp1: Start / stop measurement

	Instruction			Parameter
Explanation	STA			p1: Start / stop measurement 0=Stop 1=Start
ASCII	S	T	A	1
Hexadecimal	53H	54H	41H	31H
Byte	1	1	1	1

Return	ACK / NAK

Example: start measurement:

02 01 43 **53 54 41 31** 03 34 0D 0A

Return: ACK

02 01 06 03 06 0D 0A

STA?: query measurement state

	Instruction			Parameter
Explanation	STA			Query parameter: ?
ASCII	S	T	A	?
Hexadecimal	53H	54H	41H	3FH
Byte	1	1	1	1
Return	Return measurement state			

Example: Query the measuring state:

02 01 43 **53 54 41 3F** 03 3A 0D 0A

Returns: measuring:

02 01 41 **31** 03 70 0D 0A

☆**Note:** The following instructions are to query the Sound Level Meter measurements. They contain the "return manner" parameter, it means:

Stop return: The Sound Level Meter no longer to return calculation results every second after received the instruction.

Single return: The Sound Level Meter will return the calculation results on time after received the instruction.

Continuous return: Automatically return to the current data every second after received the instruction.

Therefore, the instructions in the "return mode" parameter can be set to 2 to send to the Sound Level Meter, Sound Level Meter will send the latest calculations every second.

DMAp1_?: query the main interface data

	Instruction			Parameter **1**	Parameter **2**
Explanation	DMA			p1: Return manner 0=Stop return 1=Single return 2=Continuous return	Query parameter: ?
ASCII	D	M	A	1	?
Hexadecimal	44H	4DH	41H	31H	3FH
Byte	1	1	1	1	1

Return	Return the main interface data Filter: 0=A ; 1=C ; 2=Z Detector: 0=Fast ; 1=Slow ; 2=Imp. Mode: 0=SPL ;1=RMS ;2=PEAK ;3=LEQ ;4=MAX ; 5=MIN Range: 0=Low ; 1=High ; 2=Auto Measurement data: The value of the main interface

Example: query the data of the main interface, and returns only once:

02 01 43 **444D 41 31 20 3F** 03 25 0D 0A

Returns: the current data of the main interface is: A, Fast, SPL, Auto, measurement data 073.6dB.

02 01 41 **30 2C 30 2C 30 2C 32 2C 30 32 35 2E 33** 03 69 0D 0A

TPR?: query 3Profile interface data

	Instruction			Parameter **1**	Parameter **2**
Explanation	TPR			p1: Return manner 0=Stop return 1=Single return 2=Continuous return	Query parameter: ?
ASCII	T	P	R	1	?

Hexadecimal	54H	50H	52H	31H	3FH
Byte	1	1	1	1	1
Return	Return 3Profile interface data First group: Filter, Detector, Mode, Range, Data Second group: Filter, Detector, Mode, Range, Data Third group: Filter, Detector, Mode, Range, Data				

Example: query 3Profile interface data:

02 01 43 **54 50 52 31 20 3F** 03 3B 0D 0A

Returns: the current 3Profile Interface data:

First group: A, Fast, SPL, Auto, 023.6dB;

Second group: C, Fast, SPL, Auto, 026.6dB

Third group: Z, Fast, SPL, Auto, 030.6dB

02 01 41 **30 2C 30 2C 30 2C 32 2C 30 32 36 2E 33 2C 31 2C 30 2C 30 2C 32 2C 30 32 36 2E 36 2C 32 2C 30 2C 30 2C 32 2C 30 33 30 2E 36** 03 6E 0D 0A

DLN?: Query statistics analysis data (LN)

	Instruction	Parameter **1**	Parameter **2**
Explanation	DLN	p1: Return manner 0=Stop return	Query parameter: ?

				1=Single return 2=Continuous return	
ASCII	D	L	N	1	?
Hexadecimal	44H	4CH	4EH	31H	3FH
Byte	1	1	1	1	1
Return	Return statistical analysis (LN) data Filter: 0=A ; 1=C ; 2=Z Detector: 0=Fast ; 1=Slow ; 2=Imp. Mode: 0=SPL ;1=RMS ;2=PEAK ;3=LEQ ;4=MAX ; 5=MIN Range: 0=Low ; 1=High ; 2=Auto LN data sources: 0=Profile1 ;1=Profile2 ;2=Profile3 Group 1 LN percentages and LN statistics …… Group 10 LN percentages and LN statistics				

Example: query statistical analysis (LN) data,:

02 01 43 **44 4C 4E 31 20 3F** 03 2B 0D 0A

Returns: the current statistical analysis (LN)data: A, Fast, SPL, Auto, Profile2, LN10=074.2dB, LN20=074.2dB, LN30=074.2dB, LN40=047.9dB, LN50=027.3dB, LN60=027.2dB, LN70=027.1dB, LN80=027.0dB, LN90=027.0dB, LN99=026.9dB

02 01 **41 30 2C 30 2C 30 2C 32 2C 31 2C 31 30 2C 30 37 34 2E 32 2C 32 30 2C 30 37 34 2E 32 2C 33 30 2C 30 37 34 2E 32 2C 34 30 2C 30 34 37 2E 39 2C 35 30 2C 30 32 37 2E 33 2C 36 30 2C 30 32 37 2E 32 2C 37 30 2C 30 32 37 2E 31 2C 38 30 2C 30 32 37 2E 30 2C 39 30 2C 30 32 37 2E 30 2C 39 39 2C 30 32 36 2E 39** 03 70 0D 0A

DCU?: Query custom data

	Instruction			Parameter **1**	Parameter **2**
Explanation	DCU			p1: Return manner 0=Stop return 1=Single return 2=Continuous return	Query parameter: ?
ASCII	D	C	U	1	?
Hexadecimal	44H	43H	55H	31H	3FH
Byte	1	1	1	1	1
Return	Return custom data: Group 1Filter, Detector, Mode, Data …… Group 14Filter, Detector, Mode, Data				

Example: query custom measuring data:

02 01 43 **44 43 55 31 20 3F** 03 3F 0D 0A

Returns: the current custom measuring data:

Group 0: A, Fast, LEQ, 023.1dB,

Group 1: A, Fast, L10, 028.1dB,

Group 2: A, Fast, L50, 026.4dB,

Group 3: A, Fast, L90, 025.3dB,

Group 4: A, Fast, MAX, 048.3dB,

Group 5: A, Fast, MIN, 022.3dB,

Group 6: A, Fast, SD, 002.3dB,

Group7: A, Fast, SPL, 024.8dB,

Group 8: C, Fast, SPL, 025.6dB,

Group 9: A, Fast, RMS, 023.7dB,

Group10: C, Fast, RMS, 024.5dB,

Group 11: A, Fast, SEL, 049.8dB,

Group 12: A, Fast, E, 8.737e-09,

Group 13: A, Fast, Peak, 046.5dB,

☆**Note:** Parameters with an asterisk * in fact not work.

02 01 41 **30 2C 30 2C 30 38 2C 30 32 33 2E 31 2C 30 2C 30 2C 30 39 2C 30 32 38 2E 31 2C 30 2C 30 2C 31 33 2C 30 32 36 2E 34 2C 30 2C 30 2C 31 37 2C 30 32 35 2E 33 2C 30 2C 30 2C 30 35 2C 30 34 38 2E 33 2C 30 2C 30 2C 30 36 2C 30 32 32 2E 33 2C 30 2C 30 2C 30 32 2C 30 30 32 2E 33 2C 30 2C 30 2C 30 30 2C 30 32 34 2E 38 2C 31 2C 30 2C 30 30 2C 30 32 35 2E 36 2C 30 2C 30 2C 30 31 2C 30 32 33 2E 37 2C 31 2C 30 2C 30 31 2C 30 32 34 2E 35 2C 30 2C 30 2C 30 33 2C 30 34 38 2E 39 2C 30 2C 30 2C 30 2C 30 34 2C 38 2E 37 33 37 65 2D 30 39 2C 31 2C 30 2C 30 37 2C 30 34 36 2E 35** 03 28 0D 0A

DSLp1_p2_?: Query all the data of the Sound Level Meter

	Instruction	Parameter 1	Parameter 2	Parameter 3
Explanation	DSL	p1: Data group 0=SPL 1=RMS 2=SD 3=SEL 4=E 5=Max 6=Min 7=Peak	p1: Return manner 0=Stop return 1=Single return 2=Continuous return	Query parameter: ?

				8=Leq 9=LN		
ASCII	D	S	L	0	1	?
Hexadecimal	44H	53H	4CH	30H	31H	3FH
Byte	1	1	1	1	1	1
Return	Return the corresponding data group: Group 0: LAF, LAS, LAI, LCF, LCS, LCI, LZF, LZS, LZI Group 1: LArms, LCrms, LZrms Group 2: LAFsd, LASsd, LAIsd, LCFsd, LCSsd, LCIsd, LZFsd, LZSsd, LZIsd Group 3: LAsel, LCsel, LZsel Group 4: LAe, LCe, LZe Group5: LAFmax, LASmax, LAImax, LCFmax, LCSmax, LCImax, LZFmax, LZSmax, LZImax Group 6: LAFmin, LASmin, LAImin, LCFmin, LCSmin, LCImin, LZFmin, LZSmin, LZImin Group 7: LApeak, LCpeak, LZpeak Group 8: LAeq, LCeq, LZeq Group 9: Percentage values and statistics of ten LN					

Example: Query group 1 (RMS):

02 01 43 **44 53 4C31 20 31 20 3F** 03 27 0D 0A

Returns: the RMS data: LArms = 023.7dB, LCrms = 024.5dB; LZrms = 028.2dB

02 01 41 **30 32 33 2E 37 2C 30 32 34 2E 35 2C 30 32 38 2E 32** 03 62 0D 0A

DTR?: Show the structure-borne noise ratio of fixed equipment

	Instruction			Parameter**1**	Parameter**2**
Explanation	DTR			p1: Return manner 0=Stop return 1=Single return 2=Continuous return	Query parameter: ?
ASCII	D	T	R	1	?
Hexadecimal	44H	54H	52H	31H	3FH
Byte	1	1	1	1	1
Return	Return structure-borne noise ratio of fixed equipment				

Example: Query the structure-borne noise ratio of fixed equipment:

02 01 43 **44 54 5231 20 3F** 03 2F 0D 0A

Return: The structure-borne noise ratio of fixed equipment is 05%

02 01 41 **30 35 25** 03 61 0D 0A

DOT?: Query octave data

	Instruction			Parameter**1**	Parameter**2**
Explanation	DOT			p1: Return manner 0=Stop return 1=Single return 2=Continuous return	Query parameter: ?
ASCII	D	O	T	1	?
Hexadecimal	44H	4FH	54H	31H	3FH
Byte	1	1	1	1	1
Return	Return octave data Integral: 0=No, 1=Yes LAeq ;LCeq ;LZeq ;31.5Hz ;63Hz ;125Hz ;250Hz ; 500Hz				

Example: query octave measurement data:

02 01 43 **44 4F 5431 20 3F** 03 32 0D 0A

Returns: the current octave measurement data is: integral, LAeq=065.0dB ; LCeq=064.1dB ; LZeq=064.8dB ; 31.5Hz=041.3dB ; 63Hz=044.1dB ; 125Hz=047.3dB ; 250Hz=051.0dB ; 500Hz=053.3dB

02 01 41 **31 2C 30 36 35 2E 30 2C 30 36 34 2E 31 2C 30 36 34 2E 38 2C 30 34 31 2E 33 2C 30 34 34 2E 31 2C 30 34 37 2E 33 2C 30 35 31 2E 30 2C 30 35 33 2E 33** 03 7C 0D 0A

CSD: Save 3Profile data into SD

	Instruction			Parameter**2**
Explanation	CSD			None
ASCII	C	S	D	
Hexadecimal	43H	53H	44H	
Byte	1	1	1	
Return	Return status: 0= Stored successfully, SD ok 1= Failure to store, SD error ; 2=No SD ;			

Example: Save CSD:

02 01 43 **43 53 44** 03 17 0D 0A

Return: Stored successfully, SD ok

02 01 41 **30** 03 71 0D 0A

6. Product Notes/Calibration/Warranty

6.1 Notes

The measurement microphone is a sensitive component, please use it carefully. Store the microphone in the attached box which can protect it against damage from outside environmental factors.

Please follow the introduction and user guide in this manual. Do not drop, knock or shake the product. Any operation over the limit mentioned in this manual could damage the product.

Keep out the water and any other liquid due to no waterproof design on this product.

Using qualified alkaline battery can extend your operation time and bring benefit to device. Do not mix using of old and new batteries at the same time. Remove batteries when the device is not in use. Long-term placement of the battery inside the product could cause battery leakage and damage the product.

6.2 Calibration

Sound level meter has been calibrated before sales. Please keep regular calibration to ensure the accuracy of the measurement. Runrite Electronics provide the calibration service of sound/acoustic products via a select series of 3rd Party approved laboratories.

6.3 Warranty

Runrite Electronics can provide warranty service during the warranty period. The component could be replaced according to the determination of Runrite Electronics to solve the issue caused by materials, design or manufacture.

Please refer to the product warranty promise in sales contract. Do not open or repair the device by customer. Any unauthorized behavior will result in loss warranty of this product.

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